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Vol. CXXVIII. No. 3318

JUNE 27, 1941

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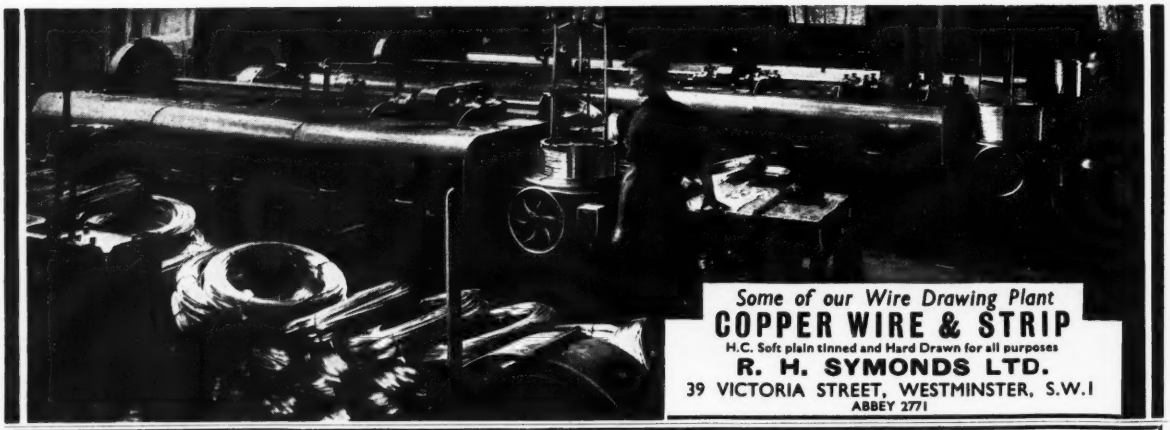
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THE
ELECTRICAL REVIEW

Volume CXXVIII — No. 3318

Friday, June 27, 1941

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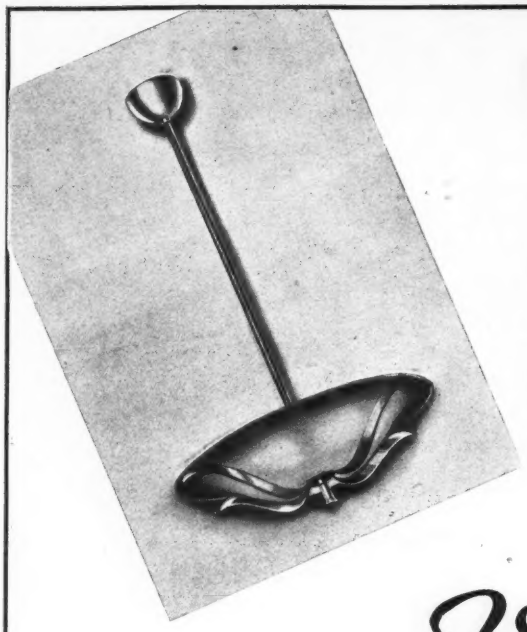

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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3318 JUNE 27, 1941 Price SIXPENCE

Our Power Resources

Their Most Effective Use in Reconstruction

RECOGNITION of the principle that national prosperity depends on the most efficient application of mechanical energy should, and no doubt will, loom largely in the Government's reconstruction programme. It will follow that the position of electricity in relation to other means of turning this energy—in our country heat energy—to social advantage will very shortly come under review.

In co-ordinating several methods of producing motive power, heat and light there has to be, no doubt, some give and take, and the electricity supply industry may be asked to make sacrifices in the wider interests of the whole. Let all be quite sure, however, that any such sacrifices are desirable—and by " desirable " we mean that they will further, and not retard, the purpose in view. This purpose we take to be the encouragement of the use of as great an amount of horse-power as possible per person in the most convenient form in which it can be employed.

If one may judge by what has happened in the past, it is within the bounds of possibility that electricity as the junior in age of the interests involved, as well as the most rapidly developing, may be called upon to yield concessions the ultimate effects of which, if agreed to, would certainly not be desirable in the sense defined.

First and foremost electricity supply must not be looked upon as a " milch cow " as it once was in regard to the relief of local rates. Our concern here is not to maintain the revenues of undertakings (desirable as this may be for meeting development charges) but to remind readers of the folly of ignoring the lesson to be derived from the fable about the goose that laid the golden eggs.

Fuel Economy

Electricity supply in Great Britain is based on coal, and ability to hold our own industrially with other countries possessing water power owes much to the use of inexpensive low-grade coal. This near-waste fuel had little market value before the advent of electricity generating stations which, with their mechanical stokers, stimulated a demand for it. The price rose more than accordingly and an extra turn of the screw was made a few years ago when not only was a further increase in price imposed but, as in the case of the recent revision in local rating methods, the additional charges differentiated against public utility undertakings as compared with other industrial organisations.

Such tendencies are directly contrary to those which led to the construction of the grid, the object of which was to aid the provision of a " cheap and abundant supply of electricity." They put a premium on the private generation of electricity in conditions favouring the use of imported fuel oil. They are an obstacle to securing commercial space heating and some kinds of industrial heating loads and hamper trolley-bus and battery-vehicle progress and, to some extent, rural development also—all again to the benefit of oil.

Retaining Special Industries

It is not merely a question of substituting a more convenient form of mechanical power for something less efficient. There are many processes in the steel-making and chemical trades, among others, that can be carried out only by low-priced electricity, failing which they go to water-power countries. Moreover such loads are often of a magnitude to alter the whole scale of generation and, by the economies cumulatively brought about, to promote electrical development in general. There is also the aspect that as a result of the flexibility and ease of control, electrical methods are employed where the alternative would be to abandon any idea of carrying out the process.

There is one argument that can be advanced against regarding electrification as providing, over a very wide and growing field, the best means of using fuel in the national interest. If the supply of low-grade coal is not enough to meet the increasing needs of the power stations, it may become necessary to use better qualities, which would involve expense in breaking up the larger lumps, apart from questions involved in diversion from more profitable markets. Before that argument can be accepted as valid, however, a thorough investigation should be made into the limits, if any, that this sets to the general proposition. Such an inquiry should give full weight to the need for reduction of the smoke nuisance.

Another way in which restraints might be laid upon electricity would be through its distribution side. Efforts may be made to continue the gas-electric truce after the war. The objections to this are manifold, but in its most elementary form its effect is illustrated by the

repressive influence on development that has resulted from the control of both services by one committee of a municipality. Finally, no scheme should weaken the valuable check on production and sales methods that is provided by leaving consumers to choose the form of power, heat or light they find most suitable for their diverse needs.

Essential Services

As announced earlier, the second informal meeting of the Institution of Electrical Engineers, to be held on Monday next at 6.30 p.m., will be devoted to a discussion on " the continuity of essential electrical services under present conditions." The discussion on this only too topical a matter, the nature of which reinforces the considerations which normally preclude publication of full reports of informal meetings, will be opened by Mr. A. J. Gibbons (London Power Co.). Having regard to the bearing of the subject on the lives of all of us just now, an exchange of views among electrical engineers should be most helpful in maintaining the proud record of electricity supply in countering the attacks of the enemy.

Voltage Variations

IT is desirable that consumers should know the extent to which variations in the supply voltage may affect the working of their apparatus. For one thing, given an understandable cause they are more likely to make reasonable allowances and less likely to blame the apparatus or electrical methods generally. Also they can appreciate more readily the value of using liberally rated heating elements and of thermostatic control of cookers. A recent article in *The Times* gives a simple explanation of the effects of low voltage on the commoner types of electrical apparatus which should not be beyond the comprehension of the intelligent layman. Those who wish to delve further into the matter may be referred to the investigations of Messrs. E. B. Wedmore and W. S. Flight and of Mr. F. S. Naylor (I.E.E. *Journal*, Vols. 76 and 79). The cost of close voltage regulation to the supply undertaking generally more than outweighs the loss of revenue due to low average voltage, but looked at in the broadest way the reverse is the case. Incidentally, while the permitted tolerance has been raised during recent years to ± 6 per cent., it is the general practice to keep to the old value of ± 4 per cent., regarding the balance as something in hand for specially difficult cases.

Reservation of Electricians

WE referred in last week's leading article to the registration of electrical contracting firms as " protected establishments." It was stated then that only firms with direct Government contracts could be registered under Group 2 of the Schedule. The official stipulation is that at least 80 per cent. of the contracts upon which men it is desired to reserve are engaged must be Government work. The group mentioned is now regarded as the appropriate one for electrical contractors and applications for admission to the Register must be made on Form N.S. 168. The form for registration under Group 4 (N.S. 169) will not now be issued. The only sub-contracts which will be regarded as Government work are those for the production of materials or articles which are clearly identifiable in, or form part of, products which themselves are the subject of direct contracts placed by Government Departments with main contractors. Contracts for the installation or maintenance of electrical plant in the premises of firms engaged on Government contracts is not Government work for the purposes of the Register. In consequence of these rulings the only way in which a contractor can secure the retention of electricians between the ages of 25 and 35 is to apply for the deferment of their calling-up notices. The E.C.A. is making representations to the Ministry of Labour and National Service in an endeavour to secure some adjustment of the situation.

Mercury-vapour Plant

TESTS carried out at Kearney power station (New Jersey) during nine recent months of practically continuous operation have indicated an over-all thermal efficiency of over 37 per cent. for a mercury-vapour and steam combination. The complete unit comprises a mercury and steam-condenser boiler with an hourly output of 300,000 lb. of steam serving a 20,000-kW mercury turbine and a 30,000-kW steam turbine supplied at 375 lb. per sq. in. and 750 deg. F. In view of the large amount of by-product power that can be produced by superposing the mercury cycle over a fixed amount of steam flow, the authors of an article in the *Electrical World* suggest that any steam plant can be given a new lease of economic life if mercury equipment is added. The supply of mercury is at present affected by the war, but if superposition is found to be a desirable expedient on the return to normal conditions, the binary cycle appears to have possibilities in this connection.

Economics and Aesthetics

IT seems strange that the Institution of Civil Engineers should have to admit that the economics of engineering projects, the organisation and management of engineering work, and the relations of æsthetic considerations to engineering design and construction have not generally been included in an engineer's education and training. The reason is probably to be found in the fact that these are matters not conformable to rules and formulæ. Hitherto, as the Institution says, such knowledge has been acquired by practical experience spread over many years. It is felt, however, that some attempt should be made to impart an understanding of the subjects to students and those in training, for they will possess increased importance after the war. An offer was made to Cambridge University to finance a lectureship for a period of five years but there were wartime obstacles to this. Nevertheless something is being done: eminent engineers and others are to be invited to visit the University to give either single lectures or short courses on subjects coming within the terms of the proposal.

Cable-drum Scarcity

CABLES, in the larger sizes at all events, are not easy to store and handle. They have to be kept on their drums until they are wanted, which may be some time. But often enough when the drums are cleared they are allowed to remain in yards for unconscionably long periods. This is bad enough in normal times, for exposure to wind and rain is not likely to improve them, but in present circumstances, when timber is so valuable, such neglect is extremely serious. We therefore reinforce the appeal made in this issue by Sir Thomas Purves, Director of the Cable Makers' Association, for the quick return of drums to the makers. Incidentally, prompt action will enable cable users to avoid increased rental or the reduction of the rent-free period.

A Sydney Sensation

WE were recently startled by a headline in an Australian electrical paper—" Boss Gutted—but soon in production again says Chief." How, after such an experience, any man could be expected to carry on passed our imagination. But after this sharp pull-up we proceeded to read the article and found to our relief that although there had been a tragedy it was not a personal one. There had been a serious fire at the Boss Electrical Manufacturing Company's works in Sydney. The building was gutted but none of the personnel appears to have suffered visceral loss.

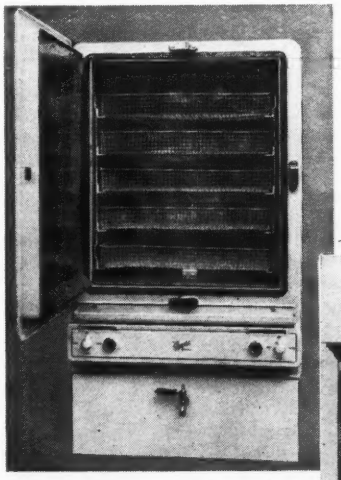
Large-Scale Cooking

Equipment Available to Meet To-day's Conditions

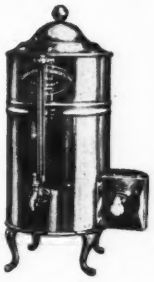
An article in our June 13th issue stated the general principles of electric cooking in canteens and other large establishments. Now we give some details of suitable equipment for various operations

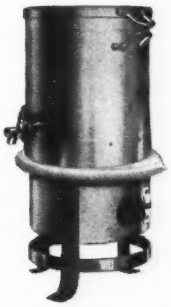
THIS article is intended to fill in some of the detail of the subject covered in our June 13th issue, in which we attempted to present to-day's somewhat peculiar, but promising position, of the electrical industry in respect of kitchen equipment for canteen and communal feeding work. We propose to review in the simplest possible manner the types of equipment that are available to meet the demands. We shall do this without reference to the finer technical details—element dispositions, automatic control, and so on—as, important as they are under normal conditions, the equipment is urgently wanted, and simplification is vital. We are convinced of the thorough soundness and suitability of all the equipment to which we refer, despite variations in methods of construction, control, etc.

We have shown that boiling is of outstanding importance for bulk and emergency feeding, so we will discuss hot drinks first. Generally the guiding principle in designing installations is that the automatic water boiler should provide continuous supplies of hot water for drinks and the urn should be used for periodical demands.



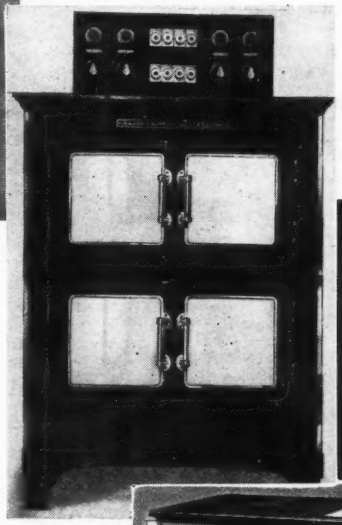
Steaming ovens run boiling equipment a close second for utility





Automatic water boiler for continuous supplies and (above) urn for periodical demands

Soup boiling is frequently coupled with the successful stock-pot and hotplate stand



A double deck roasting oven

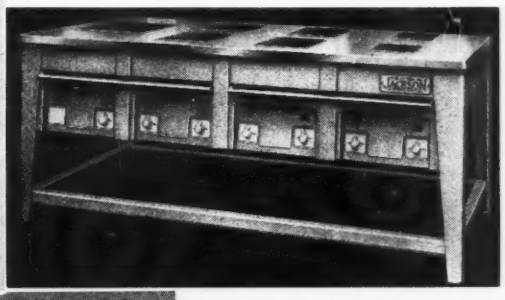
A particular water boiler is a good example of the simple equipment available for continuous hot-water service. Once it has been thoroughly heated up it may be left on the by-pass practically all day. A selected model with a continuous output of 100 pints per hour (75 pints reserve) has a standard loading of 5.5 kW. With maximum and by-pass loadings of 7.75 kW and 0.75 kW, a Jackson boiler has a rapid draw-off capacity of 100 pints and a constant-delivery rate of 5½ pints per minute.

The usefulness of combined water boiler and urn is obvious; and such is the Jackson café fountain. The storage and pre-heating system incorporated provides for large quantities of boiling water to be drawn off quickly in rush periods. Normally there are two urns (milk and coffee) in 6-, 12- and 16-pint standard sizes. A model with 12-pint urns and a maximum loading of 10 kW has a rapid draw-off reserve of 160 pints and a constant delivery rate of 6 pints per minute.

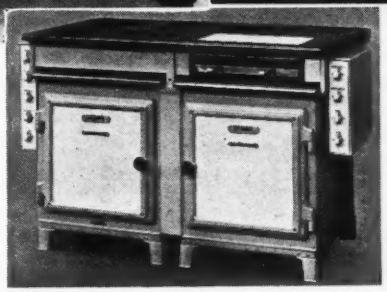
Typical of the "straight" urns is the Benham milk urn with an earthenware container and a heating jacket equipped with immersion heaters. A 3-gall. model is loaded at 2 kW. With the Jackson "Teatomaton" one can not only make and serve tea in bulk, but also prepare independent pots from a separate draw-off tap.

We believe that there is nothing to touch the self-contained boiling pan for cooking vegetables in bulk. The Benham unit with its cast-iron pan and direct-contact elements underneath is made in 20-, 30- and 40-gallon sizes. In the canteen of the electrical works referred to in our earlier article we saw two 12-kW vegetable boilers with ring-type elements clamped to the pan buttons.

Soup boiling is very similar to vegetable boiling and often the one equipment is used for both operations, but it is frequently linked up with the successful stock-pot equipment such as the G.E.C. unit in which the 16-gallon heavy-gauge aluminium boiler has a dead-flat machined bottom to make close contact with the quick-boiling hotplate mounted on a stand as a complete and separate unit. The non-electric stock-pot can also be quite as efficiently used with the normal boiling table which is installed primarily for smaller quantity boiling work, and, for that matter, on the hot-plates of combined oven and hot-plate ranges.



The choice between combined and separate equipment is linked with kitchen planning—a separate hot-plate boiling table



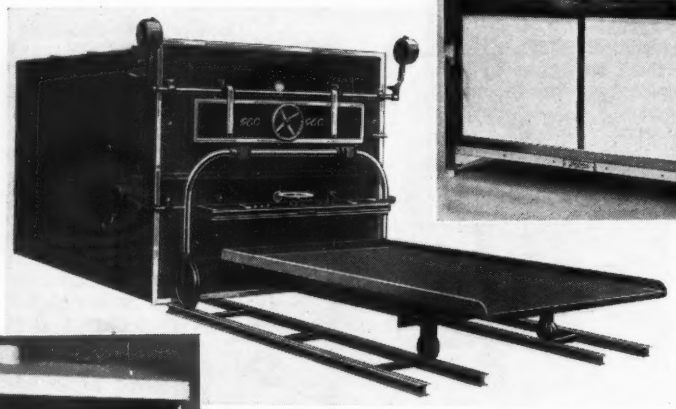
Probably the most popular form of combined boiling plate and roasting range is the double-oven equipment

The following are a few typical boiling tables. The new "Creda" has a streamlined exterior and its hot-plates are independently controlled by three-heat switches mounted in the cast-iron front upright of the box-type supports.

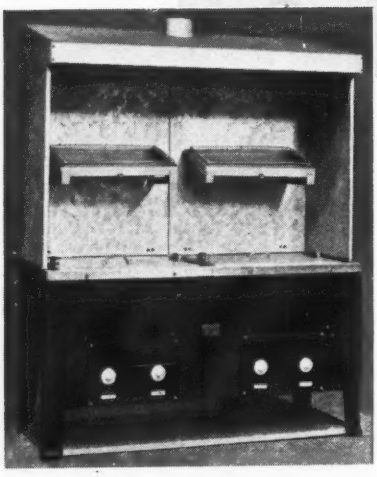
An eight-plate model has six 2.5 kW (12 in. by 8 in.) and two 1.25 kW (8 in. by 6 in.) plates. A Benham table of a large hospital installation has twelve separate plates all controlled from a panel on the end of the table below the working level. A Carron equipment has one large boiling area of 57 in. by 22 in., although this is divided into six separately controlled sections—four 2 kW, one 3 kW and one 3½ kW. The switches and pilot light are on a panel surmounting a deep back splash plate.

Steaming Equipment

Steaming ovens run boiling equipment a very close second on the score of utility. They serve equally well for vegetable cooking; indeed they often take the place of boiling pans in the smaller canteen, while sweet and meat pudding cooking are special duties assigned to them. A maker of both electric and fuel-fired steamers writes: "Electricity is very good for heating purposes on steaming ovens as it is very easy to control; no great heat is required and thermostatic control is a great advantage."



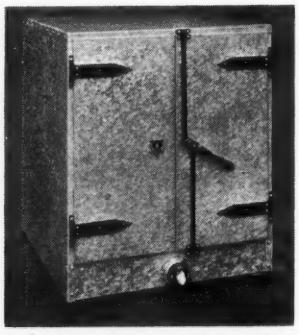
A drawplate oven for large quantities of bread



Large-scale frying equipment is of value in connection with bulk-feeding problems

The Rouse pudding or vegetable steamer has a cooking space of 2 ft. cube and the overall height outside is 2 ft. 8 in. The new "Creda" oven has an internal ball-valve tank with a draining tap, and the heating is by immersers. The larger model (8 kW) has an oven measuring 24 in. by 30 in. and overall dimensions of 33 in. by 30¾ in. by 59 in. Another food steamer has automatic cold-water feed by means of a ball cistern attached to the side of the steamer and the immersers are thermo-electrically controlled.

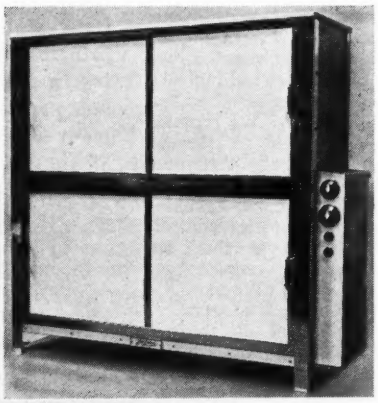
The double-compartment model with a capacity for 416 lb. of potatoes or 640 pudding basins has a loading of 15 kW. We are told that by introducing the steam at ½ lb. per sq. in. the Benham pressure steamer is more efficient in that both the cooking time and the loading are reduced. The boiler is heated by special ring fittings. The medium size model with a steaming chamber measuring 24 in. by 24 in. by 18 in. is loaded at 6.2 kW. A Carron steaming oven battery has its boiler at the side of three tiered ovens. There is an automatic water feed valve with a stone float and the total loading is 15 kW.



There is a call for the "straight" and simple hot-cupboard

The overall size is 4 ft. 3 in. by 2 ft. 5 in. by 5 ft. 6 in. and each oven measures 1 ft. 7 in. by 1 ft. 8 in. by 1 ft. 1½ in.

Next in importance in canteen cooking operations is no doubt roasting, and of the equipment specially designed for this purpose we have selected the following, mainly because they represent the different types to be considered in respect of kitchen layout. First there is the "Creda" single-oven unit, which has an oven capacity of 4.5 cu. ft. and is suitable for the needs of 25 to 35 persons. The larger model, loaded at 6 kW, has oven and overall heights of 24 in. and 40¾ in. Then there are the Benham double-deck (tiered) oven and the treble-oven "range" with the ovens side by side. The latter is mounted on legs so as to give "eye-level" height to the ovens for working comfort. The panel of switches, fuses and pilot lights can be bracketed directly on the top of the equipment. The double-deck oven is 5 ft. 9 in. in overall height and each oven, loaded at 22 kW, measures 36 in. by 30 in. by 18 in.



Bulk plate warming is a special province of the hot-cupboard

There is much to be said for the combined boiling plate and roasting oven range on the score of space saving, but the choice between combined and separate equipment is closely linked with kitchen planning and kitchen operation. We should say that the greatest asset of the combined range is its ability to meet quickly those cooking requirements which it is not possible to plan accurately for in advance. There is certainly a large variety of ranges to choose from in this respect, and as examples of smallest and largest equipments we may select the Creda "Chef" range and the Carron central galley range. The former, in its simplest single-unit form, has a 6-kW oven (19 in. by 26 in. by 27 in.) and four 2.5-kW hot-plates. The latter equipment has eight 6-kW ovens, sixteen 2-kW hot-plates, eight 3-kW hot-plates, a 3-kW hot-closet and a 6-kW bain marie.

This two-side cooking pressure griller is designed for very rapid operations

As a medium-size equipment we suggest the Benham three-oven range. Each oven cooking space is 22 in. by 24 in. by 22 in. and the total oven loading is 16.5 kW. There are twelve hot-plates with a total loading of 21 kW. Probably the most popular range is the double-oven equipment such as the Jackson, with a 3.75-kW griller, a 5-kW hot-plate (16 in. by 12 in.) and four 2.5-kW hot-plates. Each oven is loaded at 4 kW. The G.E.C. double-oven range has a 3.6-kW griller and one 5-kW, two 2.5-kW and two 1.2-kW (8 in. by 6 in.) hot-plates.

In our previous article we referred to the advisability of kitchen planning on the "continuous-flow production" principle; in this connection the "island" range idea is of outstanding interest. Many cooking ranges can be assem-

bled as multiple equipments to fit in with this idea and we saw a very good example in the canteen of an electrical works (illustrated in our previous article). The " island " is made up of four 18-kW ranges, each having one 5-kW oven and two 6.5-kW hot-plates.

Bread Baking

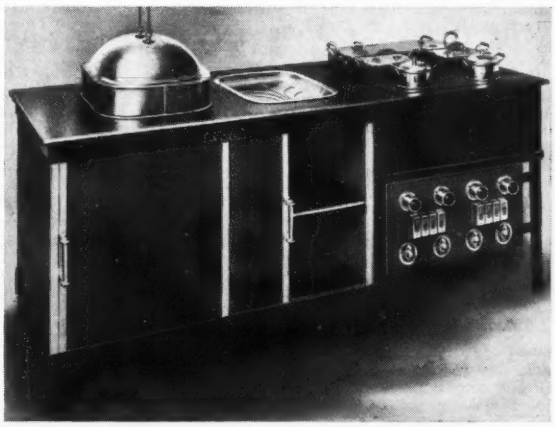
We have already referred to the necessarily considerable overlapping of oven duties in the canteen kitchen. The normal roasting oven is an efficient baking unit, but bread baking is not normally regarded as a job for the canteen installation. There is the emergency aspect to be considered, however, more particularly in the communal kitchen, perhaps. Where it is required to bake large quantities of bread the speedy drawing and setting of batches is essential and in this connection we draw attention to the drawplate oven, in which the oven sole can be completely withdrawn from the baking chamber for this operation. A G.E.C. single-deck equipment of this type with a plate measuring 8 ft. long and 4 ft. wide is loaded at 22 kW.

The adaptability of the new school of cooks in war-time canteens is evidenced by the fact that war restrictions have by no means ruled out pastry from the works canteen—and good pastry too. Excellent equipment is available for the work, the electrical industry having long since mastered the peculiar " solid " heat requirements of the pastry oven. An example is the Benham equipment in which the steel sole plate has a firebrick lining underneath to give that " solid " heat. It is available in one- or two-deck models and each 5-kW compartment measures 24 in. by 24 in. by 12 in.

In the Carron double-compartment baking oven the sole plate is of cast-iron frames inlaid with firebrick tiles embedded with cement. Each compartment measures 4 ft. by 2 ft. 6 in. by 10 in. and has both top and bottom heating—each 3 kW. As if to substantiate all we have said about the overlapping of the duties and the utility of canteen ovens, there is the Rouse all-purpose oven, which is constructed on the squat lines of the baking or pastry oven. With internal dimensions of 1 ft. by 3 ft. by 3 ft., it has a loading of 7 kW.

In our earlier article we showed the value of large-scale frying equipment, not only for fish and chips, in connection with bulk-feeding problems, but we must draw attention to possible difficulty in obtaining the necessary cooking fats. To illustrate the wide varieties of fryers suitable for all sizes of kitchens, we have selected two Rouse ranges. One has three pans—22 in. by 20 in., 25 in. by 20 in. and 31 in. by 20 in.—and an electrically heated chip box, while the other is a simple single-pan equipment of box-like construction suitable for standing on a bench or table.

Of vital importance in bulk feeding work is the necessity of ensuring a quick cycle of operations, which generally means very heavy loading. Geo. Bray & Co. have assured us that as much as 40 W per sq. in. over the whole of the pan bottom is quite reasonable. Oil leakage down to the elements has been successfully overcome by such schemes as Benham's machine-faced joint between the cast-iron curb top and the pan and Carron's idea of welding the top flange on to the pan. In its two-pan form the Simplex fryer is loaded at 16.8 kW for the 22-in. by 18 in. by 7 in. pan size.



The hot-cupboard lends itself to the incorporation of the bain marie and carving wells

The low-loaded automatically controlled hot-cupboard made its mark in the hotel and restaurant kitchen long before the war, and our previous article showed that the hot-cupboard serving counter is regarded as almost indispensable to modern canteens and communal kitchens. It also lends itself very well indeed to the incorporation of that other useful emergency feeding equipment by which food can be kept simmering for long periods—the bain marie—as well as such useful accessories as the carving well. A Benham equipment, for instance, has a 3-kW hot-closet, two 1.5-kW carving wells and a 4-kW bain marie.

But there is a call from the canteens for the " straight " and simple hot-cupboard such as the Moffat equipment, which is made of heavy galvanised steel. The inside measures 2 ft. cube. It is equipped with two 500-W plug-in tubular elements situated in the bottom side corners and controlled by a three-heat switch. The sliding doors, running on rollers, are an important feature of the Arora hot-cupboards. These are made in 3-, 4-, 5- and 6-ft. lengths, all 2 ft. 9 in. high and 2 ft. deep, and the loadings are from 3 kW to 5 kW. Bulk plate warming is also a special province of the hot-cupboard.

There is always an odd meal to be provided in the canteen, if only for the cook in the quieter moments, and what is more suitable for this purpose than the griller and/or toaster ? A simple dual-purpose equipment is the Arora, which has a cooking space of 33 in. by 12 in. and is loaded at 6.66 kW. We think the Carron pedestal griller must be very convenient from the kitchen planning and operation points of view. It is bolted to the floor. The inside measures 16 in. by 17 in., and the loading is 5 kW. The G.E.C. pressure griller is designed for very rapid grilling, heat being applied to both sides of the meat at the same time. A hinged hot-plate is pressed down on to the food on the bottom hot-plate.

Certificates in Production Engineering

IT is announced by the Board of Education that, in conjunction with the Institution of Mechanical Engineers and the Institution of Production Engineering, it has arranged for the approval of schemes submitted by technical colleges or schools working under the Board's regulations for the award of Higher National Certificates in respect of advanced part-time grouped courses which include subjects of production engineering.

For the purpose of administering the award of these certificates it is proposed to form a committee consisting of representatives of the Board and the two Institutions. Courses must be adapted to the needs of students who already possess an Ordinary National Certificate in Mechanical Engineering or have reached a similar standard of attainment, and the majority of the course subjects must be predominantly production engineering subjects. A scheme must involve a minimum time of 150 hours a year for two years.

Before approving a scheme the Committee must be satisfied as to the equipment of the school, the qualifications of the staff and the suitability of the curriculum. Recognition of the school for grant will not necessarily be accepted as sufficient for this purpose.

Rules are laid down for the conduct of examinations and the scrutiny of home work, class work and laboratory work. In order to obtain a certificate or supplementary endorsement a candidate must make not less than 60 per cent. of the possible attendances in each year of the course and must obtain not less than 40 per cent. of the possible marks in each subject of the final examination and of the possible marks obtainable in the final year for home work, etc., and not less than 50 per cent. of the grand total of marks obtainable in the final year. Arrangements are made for supplementary endorsement and distinction.

Particulars are given of the method of submitting schemes and of the duties of examination officers and a scale of fees is laid down. Further information is given in Rules 106 (P.) of the Board of Education obtainable at 1d. from the Stationery Office. Correspondence regarding the scheme should be addressed to the Joint Secretaries, Higher National Certificate (Production Engineering) Committee, The Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1.

Post-War Technical Education

Meeting the Needs of Men Serving with the Forces

By Sidney B. Haslam, M.I.Mech.E., M.I.E.E.

ONE of the principal problems to be met by those responsible for technical education in normal times is so to arrange programme and syllabus as to meet the ever-growing needs and requirements. During normal times needs can be met as they arise almost from day to day, but when this war is over they will be thrown upon us in a lump, and delay in meeting the calls would be disastrous for many. It is up to us to show that we have taken to heart the lessons learnt in 1919–20 and have profited by them.

Once again, the moment hostilities are ended, a complete change will come over the life of the nation. To a large extent the demand for munitions and the supplies of war will cease, and industry will revert again to peacetime organisation and endeavour to catch up with the retarded development of the lost years. At the same time, hundreds of thousands, nay millions, of human beings will be released from their wartime employment and seek their old or a new peacetime vocation. It is surely safe to assume that many of these will wish to enter the electrical industry in one of its many branches. The problem of providing adequate technical training will bristle with difficulties.

We must consider first the problems to be faced by the training institutions. War conditions will have made heavy drains on their resources as regards both personnel and equipment. Many to-day are able to provide and complete their normal programme only by recalling retired staff, by borrowing and by the use of women. Equipment becoming worn out or obsolete has not been replaced, and accommodation has been restricted partly to meet the demands of public services and, in many cases, due to enemy action. It must be agreed that, taking the country as a whole, facilities for technical training will be sub-normal while the demand will inevitably be super-normal.

The author of this article urges that the problem of post-war training of electrical engineers shall be faced now and makes some constructive proposals

Financial conditions will also require consideration. Peacetime industrial development has been at a standstill, and the immediate and intense resumption will call for technicians who will be offered financial incentives which will restrict the supply to the technical institutes. Further, many of those who have joined industry or Government Departments will remain, and there will be a definite lack of teachers of the required standard. It will, I suggest, be necessary to rely largely on what one might call emergency staffs, that is, part-time instructors from Government Departments, the technical units of the Army, and from the research departments of our large works, to provide the necessary training until such time as supplies become available following normal procedure. Immediate consideration should be given to this vital question if the enormous demands are to be met.

The Accommodation Problem

Another problem which will have to be faced is that of the decentralisation of industry. In pre-war days where works were grouped in or near towns with the residential areas in close proximity, a technical institute in that town met the greater proportion of training requirements. This will not apply after the war, and arrangements will have to be made in the form of hostels to provide the necessary accommodation. This will undoubtedly present difficulties. Enemy action will have restricted available accommodation. Many large houses and buildings which might have been suitable will have been acquired and will still be required for housing and feeding centres while houses are being built or re-built. Here again, plans should be made now. This side of the question will present a considerable problem and much could be written on the subject, but I am concerned in this article with the trainee rather than the trainer.

I have briefly mentioned the incipient demand for technically trained men which will become pressing immediately the war ends. What shall we have available with which to meet this demand? There will be, I suggest, three grades varying in all essentials :—

(*a*) Those who have just completed a course and have taken their degree, but are young and lacking in practical experience and the handling of men.

(*b*) Those who completed their course just before or during the war, but who then joined the forces or took up other work in which the knowledge gained has been allowed to fall into desuetude.

(*c*) Those who, during their time with the armed forces, have served with technical units or under conditions where some knowledge of engineering or science has been obtained.

As it is about this last class I am most concerned, I will deal but briefly with the others.

There will be immediate employment for the men in class (*a*). If, as I would hope, their technical education has been on the "sandwich" system and a considerable portion of each year has been employed in works gaining practical knowledge and making contact with fellow men under industrial conditions, this class should help to fill a real need, and these young men should consider themselves fortunate. Their future will be in their own hands to make or to mar.

A brief (six months) refresher course would appear to be indicated to bring grade (*b*) men up to date, and to enable them to pick up the threads of their technical education where it was interrupted by more serious calls. This course, I suggest, must be made available by, and, especially in the case of those who temporarily abandoned a career at their country's call, at the expense of the State. It is the least that can be done, and will result in a very valuable addition to the needs of industry. While my personal interest centres chiefly in the electrical branch, it is impossible to consider any one branch when dealing with post-war technical education.

It is my opinion that the electrical branch will provide the greatest number of openings and the greatest advantages. The development of the use of electricity in our domestic life came to an abrupt end with the greater industrial calls of war, but it does not require any great vision or imagination to realise what the future will hold. Our rebuilding programme will surely be on lines of decentralisation. The workers will not live near their work, and whether their dwellings be houses, flats, or even tenements, the use of electricity for all purposes must be insisted upon.

Therefore, the return of our large factories from war to peacetime manufactures, the many distribution problems, and the work of installation and maintenance, will make demands on the available supplies of technically trained men which will strain the capacity of training institutions for some time to come. The points I wish to make are that class (*a*) will be snapped up at once. There will be a waiting list for class (*b*), and even then there will be more men required, not only in this country, but in the Empire.

And now I want to urge the claims of class (*c*), and to suggest that plans should be made forthwith whereby these men will be at once taken into the industry, and the qualities which have served the country at war so well should be made available for peace. The training they will have received will have many values, but it will all have been designed to one end, namely, to secure the greatest effort and efficiency in one arm of the war machine. None the less, we can assume that these men, especially if of non-commissioned rank, possess certain sterling qualities. These will be based on reasonably good general education, also a sound, even if elementary and somewhat circumscribed, knowledge of electricity, and will include initiative, the capacity to think, and the ability to handle and control men. These qualities provide a very sound groundwork on which to build, but the building will not be easy.

Back to First Principles

Unfortunately, the basic elements of technical education will have been by-passed. They will have been taught to work out their problems from certain defined formulæ, and may not realise or have learnt how to arrive at the formulæ in question. Therefore, it is of paramount importance that special and exhaustive inquiries be made into each man's individual knowledge. In many cases he will have to unlearn, or at least "forget to remember," much that he learnt while the basic foundations are being built. It will be difficult for him to go to school again and work through elementary mathematics, etc., but it will be necessary, and the results will largely depend on the human side of the instructors. The knowledge he has gained will have to be incorporated in the course of training which must be made available, not only technical classes, but practical experience where necessary.

How is this to be done? Evening classes will meet some requirements, insofar as the student may select those subjects in which he is most lacking in knowledge. This method is somewhat Spartan, making as it does great demands on a student's mental and physical endurance. Facilities are not always closely available to a man's employment, and unless special arrangements are made, the student has insufficient time after working hours to change, eat and get to the class. Therefore, any employer must

be prepared to give facilities to enable the student to get to the institute clothed, fed and in such a state of mind as will enable him to benefit by the instruction given.

Part-time day classes offer advantages from the student's point of view, but present difficulties from the employer's. The absence of a youth or man from a working team may disorganise for that day the work of the team, and therefore some manufacturing operation.

The full-time course is, of course, most desirable. With proper planning and individual adjustment of values the student might well reach degree or at least diploma standard in two years. It must be emphasised that full and proper advantage should be taken of all the knowledge he has gained during his war service. Hence the need for individual adjustment, and the demand for more than mere technical knowledge on the part of the principal and his staff.

The further alternative lies in the sandwich course, and I consider this to be the best solution. With this arrangement a man can be in whole-time employment during six or seven months of the year, and take a full-time technical course during the remainder. Space will not allow of enlargement on the benefits of this system, but the advantage of unbroken training for long periods, whether practical or technical, must be apparent.

Whichever system is adopted the results to be aimed at must not be wholly technical and to degree standard. Trained men in the rank and file, craftsmen, foremen and shop managers are as necessary to the industry as technicians, research workers and the actual leaders, and due consideration must be given to the needs of the men suitable for these various positions.

It will be necessary to ask how the student is to support himself during these years. It may well be that State aid will be available, and in my opinion our future as a nation and as an empire will largely depend on the answer that is given. At all costs we must guard against the tragedy of unemployment and the soul destroying dole.

One final word. Any scheme, whether by Government, municipal authorities or technical institutions must take into consideration the needs of our Dominions overseas. Collaboration is essential, and we must be prepared to help the countries of our Empire by encouraging our young men to take positions in these countries until the local supply can meet the demand, and thus in a small way make up for the losses they are suffering by rallying to the aid of the Mother Country in her hour of need. If necessary, State aid must be made available for this purpose and the industries of our Dominions stimulated by the accession of well-trained and enthusiastic youth.

The Work of the E.I.B.A.

Annual Reunion Luncheon in London

DESPITE the difficulties of the times, which necessarily place an additional tax on its resources, the Electrical Industries Benevolent Association continues to maintain its useful work and has succeeded in meeting in every case the increasing number of deserving calls made on it. Actually, the annual report of the Council states that last year 207 cases were dealt with, eighteen more than in the previous year, and nearly all required financial help, the total amounting to £8,288, an increase of £343. In 101 of these cases the weekly allowances have been continuous throughout the year and ten of them have been helped without a break for ten years or more. Taking into account wives, children and other dependents of the applicants, about 442 people have been directly helped during the year.

At the President's table at the E.I.B.A. lunch : (Left to right) Mr. P. V. Hunter (the President), Miss Caroline Haslett, Sir Montague Hughman and Mr. J. N. Stephens

Moreover, the Association has continued its policy of assisting its beneficiaries in the most comprehensive manner possible, and of providing that complete social service which is the backbone of satisfactory welfare work. The effort needed to do this is increasing by leaps and bounds, as further and more complicated provisions arise relating to different kinds of compensation which is available for different people in different circumstances. It is considered wrong to be content with providing a mere money grant which will be necessary for the rest of a beneficiary's life if it is possible by the expenditure in a year in other ways of a sum several times higher, to bring that person to a state of happy independence in a relatively short period. The cost of this part of the Association's work does not appear in the figures for financial help given above, which cover only the cash portion of the help afforded in each case.

Giving further details of the Association's activities at the 1941 reunion luncheon in London last week, the president, Mr. P. V. Hunter, referred with deep regret to the recent death of Mr. Justus Eck, who was one of the founders of the Electrical Trades Benevolent Institution (the forerunner of the E.I.B.A.) and whose interest in the Association had been continuous and unremitting. The tragic death, too, of Dr. Charles Merz also robbed them of a friend who never allowed himself to be put into any position of prominence, but who was a life-long supporter of the Association, and on his death left it a legacy of £1,000. Another legacy of £500 had also been left by Mr. P. J. Sims.

Despite the increased calls on the Association's services, the finances disclosed a balance £1,400 larger than in the previous year and, as an indication of the virility of the Association, the president mentioned the formation of two new branch committees. Steps were being taken to make up the loss of income from social functions, and at Newcastle a "super sweepstake," had been arranged. The work of the E.I.B.A. was, however, much helped by the existence of electrical firms' own internal benevolent schemes, which resulted in only the most serious cases having to be dealt with by the Association. It was, moreover, these firms that were most generous in their contributions to the E.I.B.A. funds.

The gathering was a great success; over 250 guests were present.

Some of the representatives of the electrical contracting industry present : Messrs. J. S. A. Bunting, H. D. Roberts, L. C. Penwill, W. H. Walton and Walter Riggs

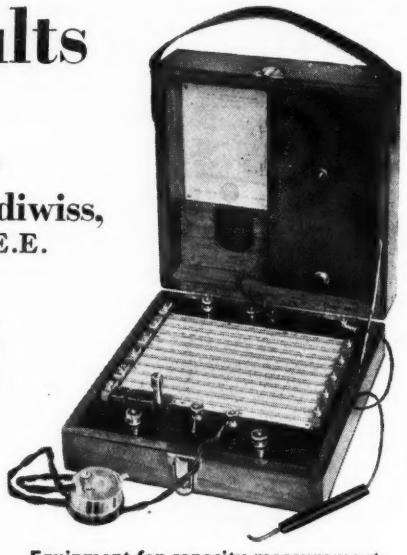
Mr. V. Watlington's (B.E.A.M.A.) table: Messrs. E. E. Hoadley, J. L. Wilson, H. T. Rice, V. Watlington, Walter Hughes, L. W. Smith and Douglas Kerr

As the E.I.B.A. offices have been evacuated from London, the arrangements were undertaken by Mr. J. J. Conlan, who has been responsible for so many successful B.E.A.M.A. functions, and no expense in connection with the lunch falls on the E.I.B.A. Mr. V. Watlington, Director of the B.E.A.M.A., announces that as a result of an appeal early this year a sum of about £2,600 has already been contributed by members of his Association.

Locating Feeder Faults

Difficulties with the Murray Loop Test

By
W. Woodiwiss,
A.M.I.E.E.



Equipment for capacity measurement (Price & Belsham)

In this article the term "equivalent length" is explained and methods for determining its value are given

THE theory of the Murray loop test is simple, but in its application factors are introduced that necessitate modifications. Practical difficulties may occur due to defective testing equipment, variations in sectional area of cables, non-availability of a core with sound conductor and insulation to complete the test loop, or the magnitude of the fault resistance being such that the usual low-voltage testing set gives no indication on the slide-wire galvanometer. The checking of the testing equipment was described in a previous article (ELECTRICAL REVIEW, July 28th, 1939).

In the simple Murray loop test it is assumed that the conductors are of uniform section throughout, and therefore their resistance is proportional to their actual lengths. This leads to the simple equation:

$D = \frac{X}{l} \cdot 2L$ yards, where D = the distance of fault from the testing terminal, L = the route length of cable, yd., X = the reading on the slide wire at point of balance and l = the length of slide wire.

In fig. 1 the Murray loop test is applied to a cable which comprises two lengths, L_1, L_2, of different sections, a_1, a_2. Let k = resistance of slide wire in ohms per unit length and s = specific resistance of copper in ohms per sq. in. per yd. Since the test is essentially a Wheatstone bridge circuit, the following resistance ratios are

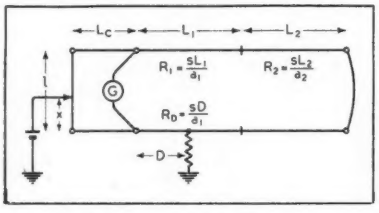


Fig. 1.—Murray loop test

$D = \frac{x}{l} \times 2\left(L_1 + \frac{L_2}{a_2} \times a_1\right)$

equal when balance is obtained:

$$\frac{kx}{kl} = \frac{\frac{s.D.}{a_1}}{2\left(\frac{sL_1}{a_1} + \frac{sL_2}{a_2}\right)}, \text{ or}$$

$D = \frac{x}{l} \times 2\left(L_1 + \frac{L_2}{a_2} a_1\right)$ yd.

The expression in the brackets is the length of uniform section, a_1, which is equivalent in resistance to the composite cable; it is briefly referred to as "the equivalent length." The equivalent length of a cable of uniform section a_2 can be calculated, viz. $2\left(\frac{L_1}{a_1} a_2 + L_2\right)$; this is evidently numerically different from the equivalent length based on a_1 section. To illustrate that these two different lengths lead to consistent results. Let L_1 = 500 yds., a_1 = 0.1 sq. in. and L_2 = 1,000 yd., a_2 = 0.2 sq. in.

Calculating on a 0.1 sq. in. uniform section, equivalent loop length $= 2\left(500 + 1{,}000 \times \frac{0.1}{0.2}\right) = 2{,}000$ yd., $D = \frac{25}{1{,}000} \times 2{,}000$ = 50 yd.

Calculating on a 0.2 sq. in. uniform section, equivalent loop length $= 2\left(\frac{500}{0.1} \times 0.2 + 1{,}000\right) = 4{,}000$ yd., $D = \frac{25}{1{,}000} \times 4{,}000$ = 100 yd. of 0.2 sq. in. cable.

But, since there are 500 yd. of 0.1 sq. in. cable interposed between the testing terminus and the 0.2 sq. in, cable it is evident that the fault must be situated in the 0.1 cable; hence converting the cable of 0.2 section to 0.1 section, $D = \frac{100}{0.2} \times 0.1 = 50$ yd. as previously.

Under the stress of actual working conditions, the substitution of numerical values in formulæ is liable to lead to confusion and error. Experience indicates the following method as being the safest way of calculating the equivalent length: A 0.2 sq. in. cable of resistance R has a length of 1,000 yd., a 1.0 sq. in. cable of equivalent resistance has a length of $\frac{1{,}000}{0.2}$ yd., so that a 0.1 sq. in. cable of equal resistance has a length of $\frac{1{,}000}{0.2} \times 0.1 = 500$ yd. Therefore, the equivalent length of loop on a 0.1 basis = 2(500 + 500) = 2,000 yd.

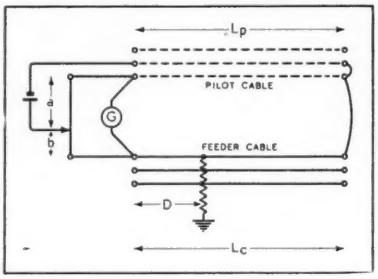


Fig. 2.—Equivalent length

$L_e = L_p \times \frac{a}{b}$

One of the most difficult faults to locate is when all three cores of the damaged cable are shorted and earthed. If the cable is a feeder it probably has an associated pilot cable connected to the pilot voltmeter or to protection gear. The most satisfactory manner of locating this fault is to utilise the pilot cable as the Murray loop return.

A convenient method of determining the equivalent length of the pilot cable is shown in fig. 2, in which $\frac{L_e}{L_c} = \frac{a}{b}$, $L_e = \frac{a}{b} \times L_c = \frac{909}{90.9} \times 1{,}000 = 10{,}000$ yd. Length of equivalent loop of 0.1 cable = 1,000 + 10,000 = 11,000 yd.

If the standard slide-wire bridge is modified to have two sliding contacts, it can be arranged to give a direct indication of the fault position. Fig. 3*a* is designed to illustrate the method of setting up the bridge. C_1 is set so that x_1 equals the length of the faulty cable; the bridge is balanced by adjustment of C_2. Then

$$\frac{y}{(x_1 + y)} = \frac{\frac{L_p \times s}{a_p}}{\left(\frac{L_c \times s}{a_c} + \frac{L_p \times s}{a_p}\right)} = \frac{\left(L_p \times \frac{a_c}{a_p}\right)}{L_c + \left(L_p \times \frac{a_c}{a_p}\right)} = \frac{L_e}{(L_c + L_e)} \text{ or}$$

$(x_1 + y) = (L_c + L_e)$ = equivalent length of loop.

Fig. 3*b* shows the location test. C_1 is connected to earth through the battery, and adjusted until balance is obtained, C_2 remaining fixed. Then, $D = \frac{x_2}{(x_1 + y)} \times$ (equivalent length of loop) $= \frac{x_2}{(x_1 + y)} \times (x_1 + y)$, that is

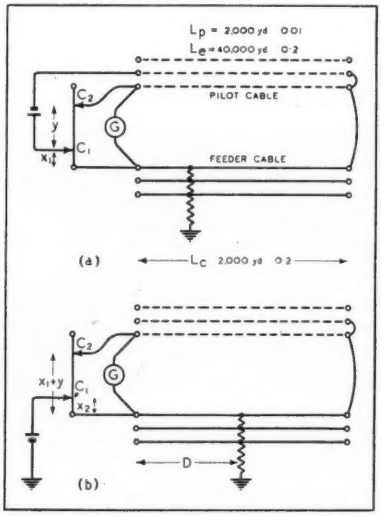


Fig. 3.—Direct-reading Murray loop test

(a) C_1 set at $x_1 = L_c$; then, at balance $y = L_e$. (b) $D = x_2$

$D = x_2$, and the bridge indicates the fault position directly.

The completion of the Murray loop testing circuits has to be completed by the connections indicated by L_c in fig. 1. To facilitate the handling and connecting, these connections are generally of small section—0.01 sq. in. or less; they increase the effective length

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.

The I.M.E.A. and the Grid Tariff

YOUR note relating to the above matter in your issue of June 20th states:—"A challenge to the Council's decision not to proceed further at the moment in its representations to the Central Electricity Board about grid tariffs met with insufficient support to be debated."

May I be permitted, as the proposer of the original resolution last year and as the mover of the reference back proposal, to say that your report gives an entirely wrong impression of what occurred. In my closing remarks at the meeting I asked that the resolution as put forward last year should be again brought forward and that definite action should be taken by the Council forthwith.

Far from this request meeting with insufficient support, the voting showed that over 99 per cent. of members present supported the motion.

Wilmslow. C. CAMERON KIRBY.

[The absence of debate to which we referred was not due to lack of support but to the rapidity with which the motion was taken. We regret that our report gave a contrary impression.—EDITORS, ELECTRICAL REVIEW.]

Portable Tool Drives

SUCH letters as that of Mr. F. C. Fuke in your issue of June 20th with its reasonably expressed and thoughtful controversial criticism, are to be welcomed. Mr. Fuke mentions only two criteria for determination of standard voltage, but unfortunately many others must be considered; otherwise I would be the first to admit that the use of any tools other than at 42, 50 or 69 V should be made illegal. That day may yet come. I doubt it—but if it does, and most people fully cognisant of all the facts agree with the ruling, I shall not oppose it. A few of the snags are:—Cable size, voltage regulation of frequency changers, voltage drop in wiring and a reduction in the performance of tools in some cases by as much as 75 per cent. when running on half voltage.

Just as dangerous as the shock condition is switch failure which has made it impossible for the operators to stop the tools or put them down to go to the nearest fuse or switch. The only way to overcome switch troubles properly on the larger tools has been through remote control contactors, and the high frequency and bad regulation have made it difficult to design coils that will always hold in.

The British consumers' voltage was standardised at 230 V to earth, and most systems that were working with 110 V to earth increased their voltage to this figure. The reduction to 72 V to earth is a very substantial one. We are satisfied to have millions of consumers using 230 V to earth, whereas to take Mr. Fuke's reasoning to its logical conclusion, all shaving machines, hair-dryers, washing machines and kettles, should be wired for 40 V or thereabouts.

Locating Feeder Faults (*Concluded from preceding page*)

of the slide wire, for which necessary correction must be made.

A simple test to determine the correction factor is illustrated in fig. 4. The two connecting leads are connected in series across the slide wire, the galvanometer across one third of the slide wire, and the battery between the sliding contact and the end of the slide wire. When balance is obtained, the following resistance ratios hold :— $\frac{C}{333 - C} = \frac{2L_c}{666} = \frac{L_c}{333}$.

But, since C is small in comparison with 333, $333 - C$ is approximately equal to 333; therefore $\frac{C}{333} = \frac{L_c}{333}$ to a close degree of approximation, that is $C = L_c$.

Because the length of the bridge is in effect increased at each end by an amount C, the true reading of the bridge, when balanced is $D = \frac{(x + C)}{(1{,}000 + 2C)} \times 2L$.

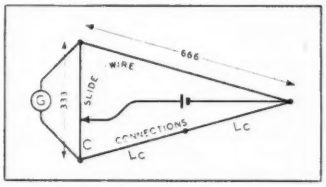


Fig. 4—Connection correction

Resistance of C = Resistance L_c.

True bridge ratio = $\frac{x + c}{1{,}000 + 2c}$

When the connecting leads are permanently connected to the bridge, the correction factor can be eliminated by short-circuiting the wire comprised in C at each end. The bridge will then give a direct true indication, allowing for the effect of connections.

These high-frequency tools are not new. Thousands of installations have been made over a number of years, and I have yet to hear of a shock fatality from a 125-V plant. I still recommend clamped plugs, and I know of at least one case where death by shock (at 230 V to earth) has been caused by the pull on the cable partly withdrawing the plug.

I dispute Mr. Fuke's suggestion that portable electric tools are notorious for high maintenance cost, and their increasing use supports my view. He is correct in most of the points in his third paragraph, but I would remind him that the tool itself would probably be earthed due to its contact with the work or the fixture mentioned.

His fourth paragraph is irrelevant, as the high-frequency equipment is self-contained and part of the factory plant itself. The earthing for the 50-cycle supply is a separate problem entirely. I also dispute his statement that 50-V three-phase gives lower installation and maintenance costs.

The earth protection scheme mentioned in my article has been given good trials. Among other things it enables the continuity of earth conductors to be checked at any time (one of Mr. Fuke's points). Pending publication and particulars, I should be very glad to show him the system in operation.

Slough. F. E. BUTCHER.

[We regret that Mr. Fuke's name was incorrectly spelt in our last issue.—EDITORS, ELECTRICAL REVIEW.]

Empty Cable Drums

THERE is increasing difficulty in obtaining timber suitable for the construction of cable drums in quantities which will adequately provide for the packing and despatch of the abnormally large supplies of electrical cables now required by the fighting services and for other purposes essential to the conduct of the war.

The Cable Makers' Association has made every effort to reduce the amount of timber used in the making of drums, by simplification of design, reduction in timber thicknesses and by open spacing of lagging battens. It has also repeatedly called the attention of all classes of its customers to the urgent need for clearing drums and returning empty drums and battens at the earliest possible moment, and has pressed railway companies and other carriers to provide expeditious transport for returned empties in order to reduce to a minimum the demand for new timber. These efforts have been widely responded to with much goodwill, but it is felt that cable users are still in a position to give much further help by systematic endeavours to clear and return the many thousands of drums in their temporary possession.

The following letter from the Ministry of Supply, Timber Control, indicates that conditions are likely to become still more stringent :—

> Owing to the present shipping position tonnage allocated to timber has been reduced to an extent which will seriously affect available supplies. It has become, therefore, a matter of urgent necessity to reduce timber consumption in order that the limited stocks which are available may be stretched to cover vital requirements.
>
> There are in existence very large numbers of cable drums despite which Timber Control is constantly being asked by manufacturers to release further timber for the construction of new drums. This timber ought not to be afforded.
>
> Your Association has been in various ways of great assistance in promoting economy in the use of timber for cable drums, but I am afraid that further efforts will have to be made to secure the more rapid circulation of those drums so that the need for replacements may be kept to a minimum. May I invite your co-operation to impress upon all cable users the importance of returning all drums to the manufacturers with the least possible delay, and also the consideration of your members to the possibility of assisting in those returns by a further and substantial increase in rentals as an additional inducement. The rent free period might be reduced from three months to only one month, an adjustment of the terms imposed by your members on cable drums which is fully justified in our present circumstances.
>
> Yours faithfully,
> (Sgd.) RUSSELL LATHAM,
> Assistant Controller.

Since the timber shortage the C.M.A. has made increases in the rentals charged for drums, which are now double the pre-war charges. The motive of these increases has been very far removed from any desire to collect increased rentals and has been wholly with a view to helping its members to get their drums back promptly by "encouraging" customers to release them at the earliest possible moment. The C.M.A. is reluctant to adopt the Controller's

suggestion of further increases, or the reduction of the present three months' rental-free period, if the voluntary co-operation of all concerned will produce the same result without such action, and it is with that hope that I ask your kind assistance by publishing this letter.

T. F. PURVES,
London, W.C.1. *Director*, Cable Makers' Association.

Association of Scientific Workers

THE letter from "Professional Engineer" in your issue of June 20th expresses a view which is out of fashion, but none the less important on that account.

Except in the most trivial of jobs good work can only be done by individualists. Moreover, uniformity does not increase happiness; rather does it destroy the very spice of living.

Truro. ANOTHER ENGINEER.

Post-war Planning

I WAS very interested in the leader in your issue of June 6th, with regard to post-war planning, and the part to be played therein by engineers.

While there is no doubt that it is admirable that engineers should band together and discuss these matters, yet I still think that something further is necessary. The forming of a committee by engineers does not get over that trouble which is so common, *viz.*, their inability to tell the world of their value. It is right that they should know their own minds, and should determine a common policy, but I think they should try to serve on the committees of other institutions (not necessarily engineering) which have also been set up to consider post-war planning.

I would suggest that it would be advantageous to join the Post-War Planning Group of the Institute of Industrial Administration which is composed very largely of works and general managers of firms who are users of electricity, *i.e.*, modern manufacturing firms. Here then is an obvious opportunity for electrical engineers to impress upon these men the advantages of electricity supply for future requirements.

The recent decision of Mr. Bevin to consult this Institute when appointing executives is a step forward, while the continual growth of this body and the interest shown in its examinations, as typified in your correspondence columns, all point, I think, to an improvement in status by the end of the war.

This is, however, not the only body which is either interested, or actually doing something about post-war planning, and I suggest that it is in the interests of engineers that they should be represented on any committee or groups which such concerns may set up.

London, E.13 G. V. HARRAP.

Force-trip Devices

IN your issue of June 13th, Mr. R. T. Lythall mentions that the expression "force-trip release" is used in clause 25 of the recently issued B.S.936. The reason for this is not that the term "force-trip release" is regarded as an acceptable alternative to the term "making-current release." The retention of "force-trip release" in parentheses in clause 25 is because in a proof of the specification "force-trip release" was the only term used for what is now known as a "making-current release."

This proof had been widely circulated, and it was thought that if the term "force-trip release" were suddenly to be dropped in favour of "making-current release" many people would not realise that a making-current release was the same thing as what had in the earlier draft been referred to as a force-trip release.

London, S.W.1 J. F. STANLEY,
Electrical Section
British Standards Institution.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced by the North-Eastern Electric Supply Co., Ltd., that **Mr. H. H. Mullens**, B.Sc., M.I.E.E., has been appointed head of the Power Department (Southern Area) in succession to **Mr. A. M. Paton**, who has taken up work with the Ministry of Supply. Mr. Mullens joined the N.E.S. Co. at Newcastle in 1924, and at the beginning of 1932 was transferred to the Southern Area office at Middlesbrough. During the period of his service with the company, Mr. Mullens has been engaged upon work relating to industrial electrification, and since 1936 he has held the appointment of chief assistant to Mr. Paton. For the session 1938–9, Mr. Mullens was chairman of the Tees-side Sub-Centre of the Institution of Electrical Engineers.

There was a serious omission from the list of King's Birthday Honours in our last issue—the name of **Mr. Walter Riggs**, president of the Electrical Contractors' Association. Mr. Riggs was appointed a member of the Order of the British Empire for his services as honorary secretary at the Aldeburgh Station of the Royal National Lifeboat Institution.

Mr. Walter Riggs

Mr. W. J. Jeffery, M.I.E.E., chief engineer of the Charing Cross and City District of Central London Electricity, Ltd., has retired after over 40 years' service. Mr. Jeffery joined the Charing Cross Co. in 1900 as a junior engineer at the Maiden Lane station, after three years as a day student at the Finsbury Technical College under Prof. Silvanus Thompson and Prof. Dalling. Some years later he was transferred to the mains department and during the last war was appointed mains superintendent, being responsible for the reconstruction of the public lighting for the City of Westminster in the Charing Cross area and, under the chief engineer, Mr. W. B. Thorpe, for the installation of public lighting on the Victoria Embankment. On the retirement of Mr. Thorpe in 1935, he was appointed acting chief engineer and later became chief engineer for the Charing Cross and City District under C.L.E. Mr. Jeffery was for many years a member of the Association of Public Lighting Engineers, and has served on sub-committees of E.R.A.

Mr. Jeffery's retirement has necessitated changes in the organisation of the Central London Electricity. He is succeeded by **Mr. R. N. Pegg**, who has been transferred from the Westminster and Chelsea District as from May 19th. **Mr. R. J. Rennie**, deputy chief engineer of the St. James' and Mayfair District succeeds Mr. Pegg as chief engineer of the Westminster and Chelsea District and **Mr. H. V. Billing**, assistant mains superintendent in the Kensington and Brompton District, has been appointed mains superintendent in the St. James' and Mayfair District as from May 27th.

An inscribed gold wrist watch has been presented to **Capt. A. J. Beckett**, the former borough electrical engineer of Bridlington, by the Electricity Committee, senior officials of the Corporation and the employees of the Electricity Department. The presentation was made by Ald. A. E. Fligg, chairman of the Electricity Committee.

Mr. I. Whipp, eldest son of Mr. and Mrs. Frank Whipp, was married on June 9th, at Christ Church, Healey, to Miss Patricia Marion Smith. Mr. Whipp, who is a director of Whipp & Bourne, Ltd., has received an electric chiming clock from the company's staff and a cocktail set and tumblers from the workpeople.

Mr. A. J. Kidwell, mains engineer at Barnstaple for the past three years, who has taken up an appointment with the London and Home Counties J.E.A., has been presented with a set of cuff links and studs from the borough electrical engineer, and an automatic trousers press from the engineering assistants and employees.

Mr. Leslie Woodcock, assistant electrical engineer to Brierfield Urban District Council, has been appointed maintenance engineer on the staff of the B.B.C.

Mr. J. C. Orkney, head of the electrical engineering department of Robert Gordon's Technical College, Aberdeen, since 1927, has been appointed Associate Professor of Civil and Mechanical Engineering and Applied Mechanics at the Royal Technical College, Glasgow. Mr. Orkney was educated at Montrose Academy and gained the diploma in electrical engineering and the degree of B.Sc. in engineering at Glasgow Technical College, where he was for a time junior research assistant in the mechanical engineering department. For nine months he was in Pittsburgh, U.S.A., and for three years in New York, and in 1926 he became senior lecturer and research assistant in the mechanical engineering department at Glasgow Technical College. In the following year he was appointed to his present post at Robert Gordon's Technical College.

Sergeant Pilot R. A. Eshelby was married at Holy Trinity Church, Paddington, on June 7th, to Miss E. M. Chater, of the General Electric Co., Ltd., London. Sergeant Eshelby was junior technical assistant in the "Philora" electric discharge lighting department of Philips Lamps, Ltd., before joining the R.A.F., and was previously with Evershed & Vignoles, Ltd., and Electrical Installations, Ltd.

Mr. G. Starkley, mains engineer to the Wallasey Corporation Electricity Department, is to retire after forty-four years' service.

Mr. A. H. Marston, of Leeds, has been appointed temporary mains assistant in the Hammersmith Electricity Department at a commencing salary of £404.

Obituary

Mr. Robert W. Cairns, of Cairns (Newcastle), Ltd., heating and electrical engineers, Newcastle-on-Tyne, has died at his home at Horncliffe, Northumberland. Mr. Cairns had been chairman of the Newcastle-on-Tyne branch of the E.C.A. and in 1928 was president of the National Federation of Master Plumbers being some years ago elected to the Court of the Worshipful Company of Plumbers.

Mr. G. J. L. Brown.—The death is announced of Mr. George J. L. Brown, M.I.E.E., joint managing director of Edmiston, Brown & Co., Ltd., mechanical and electrical engineers, Glasgow. Setting out in mechanical design, he served his apprenticeship in that and on the electrical side and, in 1908, went into business on his own account. After the last war, in which he served in France and attained the rank of staff captain, the firm of Edmiston, Brown & Co. was formed.

Mr. A. G. Page.—The death occurred suddenly on June 8th, at the age of sixty-seven, of Mr. Addis George Page, partner in the firm of Page & Bloomer, ironmongers and electrical engineers, of Stourbridge. Mr. Page was a member of the Electrical Contractors' Association.

Trade with Uruguay

By a South American Correspondent

IN the article on Argentina published in these columns on May 30th, it was pointed out that the River Plate Basin (comprising mainly the Republics of Argentina and Uruguay) is now commercially the most highly developed and richest area of South America. On the basis of securities quoted on the London Stock Exchange alone, the total of British capital invested in Uruguay is estimated at £39 million, and, as in the case of Argentina, British trade with Uruguay has for many years been of a reciprocal nature. Britain has headed Uruguay's foreign trade returns on both import and export account, British manufactured goods, coal, etc., having been shipped in return for Uruguay's wool, meat, etc.

Whilst both Argentina and Uruguay are farming countries there is an essential difference. Argentina's products are principally agricultural (wheat, maize, linseed, etc.), whereas grain takes a secondary place in Uruguay where the principal products are pastoral, particularly wool, hides and meat. Therefore, Uruguay is not faced with Argentina's present problem of unsaleable surpluses of grain, but is in a relatively favourable position, principally due to the sale of wool at profitable prices and to shipments of meat to Britain.

British trade with Uruguay, like that with Argentina, is reciprocal in character, and the market is favourably disposed towards this country

The Government is stable and progressive, and wise provision has been made against the adverse effects of the European war by accumulating a large gold reserve and exercising economy in public expenditure. There is jealous regard for the nation's credit and, in January, 1939, arrangements were made with foreign bondholders for the continued service of the national external debt on a 3½ per cent. interest basis.

The climate of Uruguay is very healthy, and the population is some 2¼ millions, with the greatest density in and around the capital, Montevideo (population 525,000), upon which city the railways—mainly British-owned—all converge. Steady progress is being made in the extension of roads, which are already among the best in South America, whilst, as elsewhere in South America, air transport is rapidly increasing. Industrial development has been relatively unimportant, except with regard to the Rio Negro hydro-electric scheme, to which reference will be made later.

Favourable Trade Balance

Uruguay consistently maintains a favourable balance in her foreign trade. Thus, imports (tariff values) totalled in 1938 74,930,700 pesos against exports (market value) of 96,342,700 pesos, the respective figures for 1939 having been 65,364,000 pesos and 101,366,000 pesos. Latest detailed trade figures cover the first nine months of 1940, and give total imports at 50,255,000 pesos (against 48,579,000 pesos in the like period of 1939) and exports at 78,682,000 pesos (against 79,767,000 pesos). Of the total exports in the first nine months of 1940, raw wool represented as much as 35,000,000 pesos; meat, 17,000,000 pesos; and hides and skins, 5,000,000 pesos.

As in the case of Argentina, the sister Republic of Uruguay conducts foreign trade on a basis of reciprocity, trade with Great Britain being governed by the existing Anglo-Uruguayan Trade Agreement. Therefore, to the extent that Britain buys Uruguayan products, Uruguay provides a corresponding amount of exchange in cover of imports from Britain. Both the source and nature of imports is covered by the system of import exchange permits.

The foreign trade statistics for the first nine months of 1940 showed that the former very important trade with Germany had virtually disappeared, whereas Great Britain continued to predominate, followed closely, however, by the United States. Actually, imports (tariff values) from Great Britain were valued at 10,867,000 pesos (against 8,965,000 pesos in the like period of 1939), and those from the United States at 5,973,000 pesos (against 2,117,000 pesos). Exports (market values) to Britain predominated at 16,592,000 pesos (against 14,311,000 pesos in the first nine months of 1939) followed by those to the United States, at 11,985,000 pesos (against 7,846,000 pesos).

The demand for goods of British origin is as keen as ever, but, unless Great Britain can see her way to increase her purchases of Uruguayan produce, especially wool, that demand cannot be wholly satisfied. Indeed, in view of recent heavy sales of wool to the United States, it would not be surprising if later trade statistics show that that country now predominates in Uruguay's overseas trade. Thus, whilst no shipments of wool were recorded to Great Britain, Germany, or any of the other large Continental markets during the first six months (October, 1940–March, 1941) of the current season, Uruguay's exports of wool actually rose to 91,322 bales compared with 72,667 bales in the like period of 1939–40, shipments to the United States alone having risen to as high as 79,543 bales against 23,853 bales.

Moreover, there is already speculative dealing in next season's wool—to be clipped from about August, 1941, onwards—at relatively high prices, from which it would appear that the United States will again be a large importer of Uruguayan wool next season. It is important to note, however, that supplies of exchange to pay for sterling imports have been sustained by British Government purchases of meat and hides.

During the last normal pre-war year of 1938, imports into Uruguay from all sources of electric wires and cables (mainly copper) cost 728,858 pesos against 631,035 pesos in 1937, and those of electric motors 141,500 pesos against 173,203 pesos. Imports of sundry electrical goods in 1938 cost 1,504,934 pesos (against 1,493,327 pesos in 1937) made up as follows, with the comparable figures for 1937 given in parentheses:—Electric lamps and valves, 269,932 pesos (443,175); radio-telephonic materials and receiving sets (excluding valves), 64,608 pesos (173,613); accumulators and batteries and spare parts, 130,417 pesos (111,289); electric meters, 75,291 pesos (79,377); telephone material, 139,320 pesos (54,525); elevators, 46,998 pesos (51,701); commutators, 55,900 pesos (43,305); receiving sets and spares, 62,830 pesos (39,951); electrical conduits, 41,021 pesos (32,035); insulating material, 13,505 pesos (28,020); domestic equipment, 29,953 pesos (23,145); material for lighting, 23,428 pesos (20,355); electro-plating equipment and spare parts, 20,915 pesos (9,510); transformers, 15,721 pesos (9,333); and other electrical materials, 408,004 pesos (295,556).

Imports into Uruguay of "electrical materials" from Great Britain increased from 23,000 pesos in 1936 to 125,000 in 1938; those from the United States declined from 408,000 pesos to 319,000 pesos; but those from Germany increased from 598,000 pesos to 1,258,000 pesos, which may be ascribed largely to the contract awarded for the Rio Negro hydro-electric scheme early in 1937 to a German combine. This was to be of immense importance to the Republic, inasmuch as it was thought possible to produce sufficient electric light and power for the whole of the Republic and thus reduce imports of coal, etc., mainly from Great Britain.

In the same year as the contract was awarded work was commenced on the damming of the Rio Negro and the construction of a plant capable of producing 500,000,000 kWh per annum. The work has been financed by means of internal bond issues. The amounts involved in the contract aggregated over 20,000,000 pesos (Urugyayan) and £2,000,000 sterling, and, of the latter amount, 60 per cent. was to be payable in cash and the balance in Uruguayan wool, etc., to be shipped to Germany. In fact, it was hoped to build up reciprocal trade with Germany to a level reaching that with Great Britain.

Rio Negro Scheme Suspended

These hopes were, of course, nullified by the European war and the British blockade of Germany. In April, 1941, it was officially announced that, although the German contractors had been working normally on the civil engineering part of the undertaking and that the manufacture of the machinery was proceeding in Germany, shipments of the machinery already manufactured had not been possible owing to hostilities. It was subsequently announced that the Uruguayan authorities did not intend to make any further representations to the British Government for permission for the machinery to be shipped from Germany to Montevideo. It was added that, as neither British nor American firms would undertake to manufacture similar machinery in the requisite time, the scheme was to be suspended until after the war, once the constructional work was finished which should be in December next.

Whilst, therefore, the future of the Rio Negro scheme is indeterminate, it is to be noted that a public works programme was adopted for 1940–41 for the expenditure of some 18,000,000 pesos on new constructional work on roads, buildings, railways, etc.

In the present struggle, Uruguay is intensely pro-British, and feeling against Germany is running very high. Therefore, with the virtual elimination of trade with Germany, the present moment is propitious for British exporters to endeavour to extend their market in Uruguay, and especially to lay the bases for trade after the war, when Anglo-Uruguayan commercial relations should resume their uniquely reciprocal character. The remarks regarding methods of opening business connections in Argentina (see page 694 of the ELECTRICAL REVIEW of May 30th) apply equally to Uruguay as also the information regarding sources of advice. Again, prices must be keenly competitive, and correspondence,

catalogues, etc., drawn up in the Spanish language, and the metric system employed in quotations, estimates, etc.

As Britain has concluded a Payments Arrangement with Special Account with Uruguay, payment for goods dispatched from the United Kingdom is required, under the British Defence Regulations, to be received here within six months. However, if there is an adequate reason for granting longer credit terms, it is usually possible to obtain an extension of time from the appropriate authorities.

Practically all the import merchants are centred in Montevideo. The unit of currency is the *peso*, which is sub-divided into 100 *centesimos*. The rate of exchange employed for payment for imports from the sterling area through Special Account is the controlled market rate which is at present fixed at 7.63 pesos per £. A large proportion of trade is conducted by means of documentary payments sent through a bank for collection, although Uruguayan importers frequently open letters of credit which permit payment to be obtained against documents in London. When bills are sent for collection they are usually drawn on Uruguayan buyers at sight and occasionally at 60 days.

The Uruguayan exchange control regulations require an import permit to be obtained for all goods entering the country. This permit need not be applied for until the goods arrive, but the control authorities strongly recommend importers of goods from the United Kingdom to apply for permits before placing orders, so as to avoid possible delays in clearing the goods from the Customs. Each importer is allotted a yearly quota of foreign exchange and, within this limit, he can obtain cover as it becomes available, the supply being regulated by announcing monthly "global" quotas for each country. These global quotas generally specify the class of articles for which exchange is procurable and the amount available for each class.

NEW BOOKS

Advanced Electrodynamics. Direct-current Machinery Design.

Radio Laboratory Handbook. By M. G. Scroggie, B.Sc., A.M.I.E.E. Second edition. Pp. 401; figs. 219. Iliffe & Sons, Ltd. Price 10s. 6d.

Extensive revisions have been made to the second edition of this useful handbook, new matter including Q-meters, crystal-controlled frequency calibrators, and double-beam cathode ray tubes, while more attention is given to transmission line technique.

Fundamental principles are discussed, and detailed descriptions are given of sources of power and signals, instruments and measurements. Ultra-high-frequency work is dealt with, and a collection of the most useful formulæ, symbols and abbreviations, with tabular and other data are included. The book will prove particularly valuable to students and teachers in technical colleges and schools running experimental radio classes, and to radio societies.

Wireless Servicing Manual. By W. T. Cocking, A.M.I.E.E. Sixth edition. Pp. 314; figs. 125. Iliffe & Sons, Ltd. Price 6s.

This handbook, which is now in its sixth edition, has a wide appeal for Service engineers, and the contents have been thoroughly revised, while new material has been added, including a chapter on automatic frequency control, in which various practical methods are described and discussed. The greater portion of the book is devoted to methods of locating and remedying the various defects in receiving equipment.

Revision and extension has been made of the valve base connection tables, which cover British and Continental types.

Electrodynamics. By Leigh Page, Ph.D. and Norman Ilsley Adams, Jr., Ph.D. Pp. 506, Figs. 115. Chapman & Hall, Ltd., 11, Henrietta Street, W.C.2. Price 32s. net.

The aspect of this book which strikes one most forcibly is the relativistic approach to the subject and whilst all writers may not be inclined to agree that "this is the only logical approach to electromagnetic theory," one must bear in mind two important facts. These are that the book has been written by two Yale professors of physics and that the scope of the work is such as to include subjects which form a part of the relativistic whole. The senior author, moreover, is professor of mathematical physics, which fact may at least imply a bias towards the ultra modern viewpoint. We say this in no critical sense but only by way of indicating the underlying spirit of the book which is described as "an advanced text in the theoretical aspects of electrodynamics."

The first chapter deals with three-dimensional vector analysis, employing the del operator ∇, the curl of a vector, Gauss', Stokes' and Poisson's theorems, and the dyadic system of vector notation. Chapter two discusses the principle of relativity with subsequent reference to one-dimensional and three-dimensional space and the Lorentz space-time transformations. The elemental properties and equations of the electromagnetic field are given in chapter three, while chapter four relates to the elementary charge and the force equation. Equations are given for the field of a point charge when at rest, when moving with a constant velocity and with constant acceleration. The equations of performance are given for the Lorentz electron (a uniformly charged spherical shell, every point of which is simultaneously at rest), and for the spinning electron (a Lorentz electron with the addition of an electric moment and a magnetic moment) at rest and in motion.

Chapter five discusses electromagnetic equations in dielectrics, magnetic materials and conducting media at rest and in motion. The next chapter derives equations for the electromagnetic energy and the flux of energy in an electromagnetic field, for stress and momentum in a homogeneous and in a non-homogeneous medium, and for simple harmonic waves guided by perfect and imperfect straight conductors in a homogeneous isotropic medium. Radiation and radiating systems form the subject matter of chapter seven which embrace the point charge, a group of point charges, the spinning electron, the spherical conductor, and the prolate spheroidal conductor. Chapter eight discusses the electromagnetic theory of light in homogeneous isotropic and anisotropic media, reflection and transmission, metallic reflection, and the Zeeman effect.

The last two chapters deal, respectively, with four-dimensional vector analysis, which includes a brief note on tensors, and general dynamical methods relating to the motional study of a group of charged particles placed in an external electromagnetic field. The latter include Lagrange's equations, Hamilton's principle, the Hamilton-Jacobi equation, and a study of cosmic ray trajectories based upon the motion of an ion in the field of a uniformly magnetised sphere.

This is an outstanding contribution to the literature of a subject upon which much has already been written and authors and publishers alike deserve the thanks of physicists and engineers for the conception, the care and industry which is so abundantly displayed in the preparation and publication of the work. —S. A. S.

Principles of Direct Current Machines. By Alexander S. Langsdorf. Pp. 746; over 500 illustrations and diagrams. Fifth edition. McGraw-Hill Publishing Co., Ltd. Price 38s.

Despite recent developments which have led to a very extensive use of AC machinery, DC still finds numerous applications in the electrical engineering industry, as for example, in isolated installations where relatively low power is required, and DC machines are, therefore, being still extensively employed. Moreover, many of the principles underlying the design of DC generators and motors are also of fundamental importance in the design of AC machinery so that a study of these principles is of value to every engineer who is interested in the question of the generation and use of electrical energy.

Langsdorf's book has deservedly come to be regarded as a standard work on the subject, particularly in the United States, which is the country of its origin, and its popularity is emphasised by the fact that, since it first appeared in 1915, four new editions have been called for. In this, the fifth edition, the author has taken the opportunity of re-writing and amplifying that part of the work dealing with the general principles of electricity and magnetism in the light of the electronic theory and this now covers nearly one-third of the entire volume. There is also an important chapter on systems of electrical units in which the M.K.S. (meter-kilogram-second) system as adopted by the International Electrotechnical Commission is explained. It may be noted that while the author admits the advantages of this system he still retains a number of formulæ in terms of c.g.s. and even of ft.-lb.-sec. units so that the reader is familiarised with all systems until such time as the industry universally adopts the M.K.S. or some other rationalised system.

For the rest, the book gives a very careful treatment of the design of DC generators and motors which is so comprehensive that it is difficult to mention any phase of the problem which is not thoroughly dealt with. It may be added that the book has been primarily written for students in technical colleges, to whom it can be unhesitatingly recommended, and that the methods of the calculus have, therefore, been freely used. That should not, however, lessen its value to the practising engineer who may desire to keep abreast of the principles underlying his profession in the light of the important developments of modern science.

A number of numerical examples are given at the end of the book which, it is stated, have been successfully solved in the author's classes. It is to be regretted, however, that the answers are not also given, although they are available upon application to the publishers.—A.R.

Troubles of Electrical Equipment—Their Symptoms, Causes and Remedy. By H. E. Stafford. Second edition. Pp. 373; figs. 330. McGraw-Hill Publishing Co., Ltd. Price 21s.

There is a great deal of good stuff in this book, which embodies the author's experience over thirty years as an erecting, maintenance and consulting engineer. The chapters dealing with troubles and their remedies cover induction and synchronous motors, DC machines, transformers and auto-transformers, oil circuit-breakers and relays, lightning arrestors, voltage regulators and the location of cable faults.

Further useful material includes the application of auto-transformers, operation and proper methods of connecting instrument transformers, motor control, and problems connected with the use of power. The book is by no means all descriptive: technical diagrams are used freely throughout. The information is well arranged and in places neatly tabulated. Though the standard of presentation differs in the several chapters, most readers will find the book well worth consulting.—S.P.S.

Shorter Notices

Power System Interconnection (Transmission Problems.) By H. Rissik. Pp. 239; figs. 99. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 25s.

The Identification of Molecular Spectra. By R. W. B. Pearse and A. G. Gaydon. Pp. 221; plates. Chapman & Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 42s.

Practical Solution of Torsional Vibration Problems, Vol. II. By W. Ker Wilson. Second Edition. Pp. 694; fig. 236. Chapman & Hall, Ltd. Price 42s.

COMMERCIAL and INDUSTRIAL

Steel Supplies Procedure. Emergency Mobile Canteen.

Gas and the Grid

IN a paper presented at the annual meeting of the Institution of Gas Engineers, Col. W. M. Carr (United Kingdom Gas Corporation, Ltd.) maintained that the day of the small undertaking operating as a separately controlled unit in a restricted area had passed, and the problem of co-ordination and grouping of all such units must be a first consideration of the gas industry after the war.

According to the *Gas Times* report, he said that the gas industry must fight for proper recognition of the service and function it could fulfil, not operating as it had done with a multiplicity of small undertakings serving restricted areas with gas at relatively high prices, but amalgamated and grouped for the centralisation of manufacture in large and economic gas making units linked up to ring main distribution systems, to ensure a supply of constant quality, purity and pressure.

No less important was the technical service to be rendered to the consumer, both domestic and industrial, and finally, co-ordination of sales and commercial activity. It could not be gainsaid that the electrical grid had proved of great advantage in raising the standard of electricity supply, particularly in urban and rural areas, and whilst some of the larger electrical undertakings had complained that the grid had brought little direct advantage to them, he believed it was appreciated that the improvement of electricity supply service was general throughout the country, and so proved of advantage to the industry as a whole.

Engineers Demand Higher Wages

At last week's annual conference of the National Committee of the Amalgamated Engineering Union a resolution was carried expressing "disgust" at the recent wage award of the National Arbitration Tribunal, and calling for an immediate application for an increase of 4d. per hour upon the current basic rates. It also demanded monthly adjustments in accordance with the rise in the cost of living. It was decided that if a satisfactory settlement had not been reached by the beginning of September the National Committee should again meet to decide upon a course of action.

Licences for Conduit

The Electrical Contractors' Association has reminded its members that licences for the purchase of steel conduit are granted on the basis of weight, independently of the length and size. To avoid delays, therefore, reasonable care should be taken to ensure that the weight given corresponds to the length and size of conduit required. Unless this is observed applications are likely to be held up while investigations are being made.

Motor Maintenance

A very useful guide to the installation and maintenance of motors has been received from Brook Motors, Ltd., Empress Works, Huddersfield, in the form of a twenty-page booklet (List 511) of convenient pocket size entitled "Technical Points and Problems." It commences with hints on the installation of driving belts and pulleys, bearings, speed and torque requirements, etc. The numerous diagrammatic sketches of starter and winding connections should be most helpful, while the technical data and advice on electrical fault tracing are very practical.

Acquisition of Steel

The Iron and Steel Control has issued a pamphlet giving the main outline of the distribution of steel supplies scheme. Before steel can be acquired for any purpose, the buyer requires an authorisation from the Government Department responsible for the work for which the steel will be used (in the case of electricity supply undertakings from the Electricity Commissioners). The pamphlet includes a full and up-to-date list of the responsibilities of each of the Departments, and of the addresses to which applications for steel authorisations should be made.

This list reflects a number of developments since it was last issued in the Steel Distribution Booklet in September, 1940. For example the responsibility of issuing all authorisations for steel for hand tools has since been grouped under the Hand Tool Directorate of the Ministry of Supply. This represents an important simplification of procedure as previously application for steel for tools might have had to be made to one of many different Government Departments.

It is believed that users of steel will find the pamphlet of considerable value as a simple statement on the procedure for acquiring steel, and as a convenient reference for future use. Copies of the pamphlet can be obtained from the Iron and Steel Control, Ashorne Hill, near Leamington Spa, Warwick.

Scottish Apprentices' Wages

The Electrical Trades Union has been informed that the employers in the electrical contracting industry in Scotland have decided to double the bonus at present payable to apprentice electricians. This means an increase of 1s. to 3s. a week according to service for 3,000 apprentices as from the first pay day in June.

Power Company's Mobile Canteen

A mobile canteen has recently been purchased by the Mersey Power Co., Ltd., primarily for feeding repair squads in the event of air raid damage to the company's mains. Should it not be required for this purpose, however, the canteen is to be loaned, complete with personnel, to local authorities in the area for emergency feeding after air raids. The company's demonstrators will supervise and help with all feeding arrangements, and additional helpers have been successfully enrolled from the various Women's Guilds in the district and the W.V.S.

The Mersey Power Co.'s mobile all-electric canteen

Designed to the company's own specifications, the canteen is in the form of a trailer attached to a 16-HP Austin car. It is approximately 14 ft. long by 6 ft. 6 in. wide by 6 ft. 6 in. high, and contains a separate kitchen and serving apartment. The equipment provides facilities for making tea, coffee, etc., and for cooking soups, stews and simple hot meals, and there is ample storage accommodation for foodstuffs, crockery (96 mugs, plates, etc.), and cutlery.

Three large storage tanks together contain 70 gallons of water. Duplicate equipment for cooking is provided. Electrical equipment to be used if a point of supply is available includes a breakfast cooker and a 10-gal. washboiler. The alternative is "Bottogas" heated urns and a small oven. Insulated heat-retaining containers are also included should it be necessary to prepare food at a depot. The kitchen contains the main sink for washing-up, but there is also a small sink in the serving counter for rinsing cups, etc., during rush periods.

The company has also recently secured a contract to supply and install the equipment in two all-electric school canteens for the borough of Widnes. These canteens are to provide hot meals for 200-250 children each, but in an emergency they would be used as cooking depots for the preparation of meals for feeding air-raid victims. The following electrical equipment is to be installed, half in each centre: Two double oven, 6 hotplate cooking ranges; two 20-gal. vegetable boilers with steamers, etc.; two hot cupboards; four 10-gal. washboilers; two 60-gal. storage heaters; two 5-cu. ft. domestic refrigerators; two potato peeling machines; two slicing machines; and two extractor fans. The total loading is approximately 96 kW.

Heating Pads and Blankets

The Electrical Wholesalers' Federation informs us that the Board of Trade ruled last December that down quilts, and other textile articles, containing stuffing, should be included in Class 6 of the Limitation of Supplies Order, and that electrically heated blankets and pads were to be regarded as controlled in this category. As controlled goods in Class 6 were not electrical products, no notification of this fact has been given to the electrical industry.

Wholesalers who are interested in the sale of electrically heated pads and blankets should therefore immediately make application for registration in Class 6, as the new edition of the Home Trade Register will shortly be printed.

The Board of Trade points out that wholesalers of these goods who were not registered in Class 6, during the period which ended on May 31st, cannot be held responsible for failure to carry out obligations which were imposed upon registered persons. Those wholesalers who only became aware of the need for registration at a late stage of the period of restriction, will be given special consideration if they draw the attention to the facts when making returns of controlled goods supplied during the period September 1st, 1940, to May 31st, 1941.

Standard Traction Motors

There has been a standard specification for traction motors for many years, but not for the various other rotating electrical parts of the equipment of electrically-propelled rail and road vehicles. These machines are now included in B.S. 173, which also contains a revision of the specification for traction motors. This comprehensive new specification covers the classification, rating and methods of test for AC and DC traction motors, main motor-generator motors, main generators, auxiliary motors, auxiliary generators and dynamotors, phase convertors and DC convertors, all of which types of machines are defined in terms of their functions. Appendices deal with the standard methods of determining efficiency, and the losses in the driving mechanisms.

Copies will be available shortly from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d., post free.

A.R.P. Signs

The Ministry of Home Security recently issued a circular approving of the use of location and direction signs to indicate public gas cleansing centres. Their design is specified in an addendum to BS/ARP.32, copies of which may be obtained from the British Standards Institution, 28, Victoria Street, London,

S.W.1, gratis, but applications for the addendum should be accompanied by a stamped addressed envelope.

Artificial Sunlight for Factory Workers

Hospitals have used ultra-violet rays for many years as a cure for various ills, but it is not generally realised that these rays may also be employed as a tonic and a safeguard against illness for a large number of people, especially factory workers, who, as a result of war-time conditions have to bear a severe strain. Employees are called upon to work longer hours; nervous tension is increased; food may sometimes lack the nutritive value of peacetime and, most important of all, is the effect of daylight restriction. Three minutes' treatment with an artificial sunlight lamp is equivalent to twelve hours' sunshine, and the beneficial results due to the ultra-violet rays forming vitamin D in the system, tone up the blood stream. The treatment increases the resistance to infection, improves muscular energy and results in the lessening of fatigue.

A group of workers at the Guy Motors factory undergoing artificial sunlight treatment

Guy Motors, Ltd., Wolverhampton, now have had two winters' experience of giving artificial sunlight treatment to their staff and employees, and the results obtained are impressive. The treatment is purely voluntary and the applicant must first consult the works doctor, who certifies whether he or she is in a fit condition. The treatment is usually carried out at 3 ft. from the lamp and to ensure that the patients do not get any closer a guard rail was introduced. One lamp will treat twelve people at the same time and an endeavour is made to keep them in the same group. The time at which any particular group should go for treatment is announced five minutes beforehand over the loudspeakers, and to avoid the group being held up by late comers, they are expected to contribute a penny for each minute they are late to the Red Cross box as a penalty. The maximum time that anyone is away from his work is ten minutes, and as evidence of the popularity of the treatment records show that less than 1 per cent. of the people who have taken the treatment have dropped it. Last winter only 3 per cent. of those who attended the treatment were absent through illness, as compared with a figure of 10 per cent. for those who did not undergo treatment.

Photography in Electrical Engineering

Some recent developments in the applications of photography in electrical engineering were indicated on June 17th by Dr. D. A. Spencer at a meeting of the London and Home Counties branch of the Institute of Physics held at the Kodak Lecture Hall, Wealdstone, Middlesex. One of these was a new type of X-ray tube emanating from the American Westinghouse organisation in which the use of a hot cathode to supply the electron stream to the anode target is replaced by a condenser discharge through the tube. In this way a "flash" of X-rays is generated during the period of the discharge, which is of the order of a half-millionth of a second.

With extremely rapid exposures of this type it had been possible to secure radiographs of rapidly moving parts with the crisp definition needed for mechanical investigation. A new flashlamp, also of American origin, made on entirely novel lines was stated to provide some five thousand flashes of extremely high intensity, each flash having a duration of 1/30,000th second.

An Industrial Radiology Group

The formation of an Industrial Radiology Group under the auspices of the Institute of Physics is announced. Its object is to provide a medium for the exchange of information on the practice of radiography and X-ray crystallographic analysis in industry. A committee has been appointed representing those employing X-rays in industry and the manufacturers of industrial X-ray apparatus and films. Membership of the Group will be open to all interested, whether at present members of the Institute of Physics or not. Fuller details will be published as soon as the constitution has been formulated. Those interested may register their names with the hon. secretary of the Group, Dr. L. Mullins, A.Inst.P., of the Research Laboratories, Kodak Ltd., Harrow, Middlesex.

New American Engineering Journal

A new quarterly journal of engineering information called *The Westinghouse Engineer* is announced by the Westinghouse Electric and Manufacturing Co. Giving the latest information on the generation, transmission and distribution of electric power, the periodical will be distributed to a selected list of engineers and executives of firms using electric power and equipment, and will also be available by subscription. Authoritative articles will be devoted to all phases of practical engineering encountered in the selection, application, operation and maintenance of electrical equipment. In the initial May issue, topics dealt with include new lighting sources, direct-current welding, the suppression of surges on arc furnaces, fireproof and explosion-proof transformers, and progress made in "atom smashing."

Supply Undertakings to be Scheduled

The Minister of Labour and National Service has agreed to bring the electricity supply industries within the field of the Essential Works (General Provisions) Order, 1941, and the scheduling of electricity undertakings will be commenced forthwith.

The Electricity Commissioners state that it is unnecessary for individual undertakers to make application for entry in the Schedule.

Red Cross Cricket Match

The British Empire XI, captained by Ray Smith, the Essex all-rounder, recently gained a close victory of 4 runs over the team raised by Mr. T. H. Windibank, a director of Crompton Parkinson, Ltd., and thus ended a two-day week-end cricket festival which resulted in £300 being collected for the Duke of Gloucester's Red Cross Fund. Played on the Crompton Parkinson ground, at Chelmsford, the Windibank XI, skippered by Mr. Norman Hills, secretary of the Crompton Parkinson Cricket Club, who has also played for the British Empire XI, was first in to bat and scored 226 runs in the first innings and 125 in the second. The British Empire XI, which included five Essex "stars", having scored only 180 in their first innings, obtained the necessary 172 runs to win in two hours.

Among the spectators were Capt. F. R. J. Peel (Chief Constable of Essex); the Mayor and Mayoress of Chelmsford (Cr. and Mrs. Sidney C. Taylor); Mr. G. E. Barford, the Town Clerk, and other officials, while electrical and manufacturing interests were represented by Mr. Frank Parkinson (chairman), who was accompanied by Mrs. Parkinson, and the directors of Crompton Parkinson, Ltd., and Mr. C. Pryke, a director of the Hoffmann Manufacturing Co. The guests were entertained by Mr. Windibank, who was responsible for all the details of organisation.

Business Women's Clubs

We have received from Miss Marjorie Hayward particulars of a Committee of Trade and Commerce which has been formed by the National Federation of Business and Professional Women's Clubs of Great Britain and Ireland, Belmont, The Ridgeway, Mill Hill, N.W.7, and of which she is chairman. The number of women in trade and commerce is rapidly mounting, and it is the purpose of the committee to enable them to secure a better understanding of economic problems to fit them for their responsibilities. Membership of the clubs is open to all women in business and the professions and already includes women in a wide range of industries and commercial concerns.

Deaf-Aid Batteries

Because of their small size and light weight so-called "high tension" batteries used in hearing aids for deaf people have hitherto been made-up of midget cells, for which at present there is a heavy demand for other purposes. It has therefore become necessary to standardise as a war emergency a range of batteries for hearing aids which the Board of Trade has arranged to have manufactured in sufficient quantity to enable such aids to continue to be serviced without undue inconvenience. There are eleven batteries in the new BS.966 standard range, adequate to serve all existing makes of hearing aids, though some modification may be needed to accommodate them. Such alteration will be of the battery casing only, not of the instruments themselves. Copies of the new specification will be available shortly from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. post free.

Fire Watchers Summoned

At Burnley recently three fire watchers at the Corporation electricity works were summoned for failing to perform their allotted duties. Mr. H. K. Foers (for the Corporation) said that the men's duties extended from noon until 10 p.m. They absented themselves and when they returned appeared to have been drinking, although not incapable of firewatching. The practice of Corporation firewatchers leaving duty was growing, and officials viewed the position seriously, he said. At the electricity works it was vital men should be at their posts but they went out and came back just when they liked. Counsel for the defence submitted that a case had not been made out. This contention was over-ruled and the proceedings were adjourned.

Trade Announcement

Wild-Barfield Electric Furnaces, Ltd., have been appointed distributors of "Prestcold" oil coolers, recently developed by the Pressed Steel Co. This new type of cooler removes the lack of certainty in quenching conditions so prevalent in many heat-treatment shops.

Catalogues Required

William Coates & Sons, Ltd., electrical plumbing and heating engineers, 20, Harburton Drive, Belfast, ask for catalogues and price lists to replace those destroyed by enemy action.

New Catalogues and Lists

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.—A 52-page illustrated catalogue of "Ediswan Industra" reflectors and illumination data.

Stanelco Products, Ferndown, Northwood Hills, Middlesex.—A brochure on electrode soldering and heating equipment.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

FAERY lighting fittings

ELECTRA vibrator

ELECTRICITY SUPPLY

More Money for Central Board. *Co-ordination in N.S.W.*

Dundee.—EMERGENCY LIGHTING OF HOSPITAL.—The Town Council is to have emergency electric lighting installed at a mental hospital, and is inviting tenders for the work.

Grampians.—THE GLEN AFFRIC SCHEME.—A Bill to confirm the Provisional Order granted to the Grampian Electricity Supply Co. was presented in the House of Commons on Thursday last week. A number of members have tabled a motion of rejection on the second reading of the Bill on the grounds that the measure is contentious and relates to a scheme which cannot be carried out during the war and may not be suitable or beneficial after the war.

Holmfirth.—INCREASE IN CHARGES.—Owing to increased cost of production it will be necessary to make a " war increase " of 5 per cent. to ordinary consumers and 2½ per cent. to power consumers. There is to be no increase in the hire-purchase charges for ordinary consumers, but the rebate on slot meters will be reduced from ¼d. to ⅛d. Reduction in staff of the electricity undertaking is also to take place, though positions will be kept open for those affected until after the war. Last year there was a loss on the undertaking of £830.

London.—POPLAR.—The Borough Council Electricity Committee is to offer the following tariffs to the Council and the L.C.C. for lighting and heating shelters :—A flat rate of 1d. per kWh for heating and 4½d. plus 20 per cent. per kWh for lighting, or a two-part tariff for lighting and heating of a standing charge of 1s. per quarter per person of seating capacity plus a running charge of 1d. per kWh for all energy consumed.

WOOLWICH. — The Borough Council is to provide electric heating at a cost of £24 at the Chislehurst caves where the borough registers are stored.

Northumberland.—REVALUATION OF UNDERTAKING.—A conference convened by the County Council has been held to discuss the position created by the North-Eastern Electric Supply Co.'s pending appeal to Durham County Quarter Sessions in respect of the revaluation of its undertaking for rating purposes. Rating authorities are to co-operate in the determination of the cumulo valuation of the company's undertaking, which operates in Northumberland, Durham and the North Riding of Yorkshire.

Portland.—CONSUMERS' AGREEMENTS.—At a meeting of the Electricity Committee it was reported that several applications had been received from consumers to have apparatus removed which had not been installed three years. It was decided—(i) To continue the practice hitherto followed that the unexpired term of an agreement to hire apparatus should be waived in cases where the consumer removes from Portland or to premises where the Council's supply is not available; (ii) That where a consumer removes to other premises in Portland where the Council's supply is available and the term of his hiring agreement has not expired he be required to pay the cost of any wiring required to enable him to make use of such apparatus, and also to continue the hiring until the expiration of the term of his original agreement and (iii) That where a consumer removes to other premises in Portland where the Council's supply is available and does not desire to continue to make use of any apparatus he has on hire he be required to pay any outstanding hire charges to complete the period of three years. The engineer reported that he understood that during the summer months requests were received from consumers to have their supplies disconnected while they were away for short periods, and he suggested that a reconnection fee be charged in these cases. It was agreed that a reconnection charge of 10s. be made.

South Queensferry.—LIGHTING AND HEATING OF SHELTERS.—The Town Council at its last meeting had before it an estimate for the heating and lighting of public shelters which worked out at an average of £19 10s. when the County Clerk informed them that the sum allowed was £12 10s. A case was instanced where the laying of a cable alone would involve an expenditure of £12 10s. and it was agreed to ask the Ministry of Home Security whether the £12 10s. was expected to cover the laying of cables.

Stretford.—SHELTER INSTALLATIONS.—As a result of a recent conference between representatives of the Corporation, the A.R.P. Committee and the Ministry of Home Security, public air-raid shelters will probably have electric lighting and heating installed shortly

Whitburn.—TARIFF ALTERATIONS.—Scottish Midlands Electricity Supply, Ltd., has offered Whitburn consumers a two-part tariff with a fixed charge of 15s. per room per annum (equivulent to 3s. 9d. per room per quarter) plus ¾d. per kWh consumed per annum.

Whitehaven.—DAMAGE TO RADIO SETS.—Reference to damage done to wireless receivers in the Bransty area, by an electrical disturbance, was made at a recent meeting of the Town Council, when it was stated that a number of expensive sets had been damaged. Ald. F. Harvey expressed the opinion that electricity boxes and mains should be examined more frequently. Coun. H. S. Taylor, chairman of the Electricity Committee, said they had had a preliminary report on the matter, but he could not say anything until they had had a full report. He added that cases of damaged sets would be considered on their merits.

Overseas

Australia.—CO-ORDINATION OF ELECTRICITY SUPPLY IN N.S.W.—According to the *Industrial Australian and Mining Standard*, the chief electrical engineer of the Railways Department, Mr. Myers, has recommended the establishment in New South Wales of an Electricity Commission " free from direct political control, and with autonomous powers, to supervise and co-ordinate existing and future major power stations and transmission lines in the State." A conference of more than 200 representatives of local governing bodies called together by the State Government to consider the question of electricity control has, however, opposed the appointment of an Electricity Commission and proposes instead the appointment of a State Electricity Committee composed of a majority of representatives of local governing bodies. It appears, continues the journal, that the reluctance of politicians and members of councils to relinquish political control of a utility which experience elsewhere has proved can be run more efficiently by an independent commission may prevent New South Wales from co-ordinating its electrical distribution on the soundest possible lines. Experts have impartially examined the subject thoroughly and a central electrical authority has been adopted in many parts of the world. It is of importance to Australia that large areas, say the different States, should have such central control, and that the reticulation networks should be made standard, so that as development proceeds interstate link-ups may be possible to utilise all sources of power supply most economically according to demand in various areas.

France. — RATIONING ELECTRICITY. — The reduction of electricity consumption in France is being enforced in a number of different ways. Each Department is responsible for its own rationing. In the Seine-et-Oise, Marne, Marne Inférieur and Calvados, no user of electricity may install any new electricity consuming machine or apparatus or undertake new wiring without the permission of the authorities. Consumption in these Departments must not exceed in one month more than in the corresponding month of 1938 ; there is a minimum of 80 kWh. Special facilities are granted for families with small children.

High-voltage consumers are limited to their consumption for December, 1940, and all who exceed the prescribed consumption have to pay three times the normal price. Domestic consumers are warned and if the offence occurs a second time the supply is cut off for eight days. A third offence involves the complete cutting-off of supply.

Central Board's Borrowing Powers Increased

THE Electricity Commissioners have made the Central Electricity Board (Increase of Borrowing Powers) Special Order, 1941. This increases the amount which the Central Board may borrow under Section 27 of the Electricity (Supply) Act, 1926, to £70,000,000, inclusive of the amounts sanctioned by the similar Special Orders of 1930 and 1933. It does not include any sums borrowed for the purpose of paying off loans previously raised.

The previous limit upon the Board's borrowing powers was £60,000,000.

TRANSPORT

Bolton.—REVISED FARES.—Revised fares and stages have been approved by Corporation Transport Committee. This eliminates many existing anomalies and aims at an approximate standard of 1d. a mile. Mr. A. A. Jackson. manager, reports that there has been no increase in fares during the war, though the Department has had to meet extra cost for wages, fuel oil, electricity, maintenance and material, amounting to £54,633 a year.

Estimates for the current year show an expected loss of £8,031. This figure has now to be increased to £13,531, because of the award of extra wages last April. This figure will be further increased by new advances, higher cost of materials, the effects of the purchase tax, extra income tax, and war damage insurance. Though more passengers were carried last year than before the war the majority travelled at workmen's fares, and increased traffic does not keep pace with higher costs. The report emphasises the need of considerably increased revenue to conserve the financial strength of the Department so that it can meet the heavy cost after the war for new vehicles, and to complete the turnover from trams and buses. It is estimated the revised fares recommended in the report will bring in an additional £45,000 a year.

Darlington. — TROLLEY-BUS OPERATION. — The Corporation Transport Committee is to investigate the possibility of ordering further trolley buses. The transport manager is also to report on the question of cutting down existing services with the object of extending the life of vehicles so that essential services can be operated for the duration of the war. Another matter under consideration is the dispersal of trolley buses to minimise damage in air attacks.

Warrington.—TRAFFIC SIGNAL IMPROVEMENTS.—Four sets of apparatus costing £120 are to be purchased by the Corporation Paving Committee for increasing traffic signal visibility.

RADIO AND TELEPHONY

Great Britain.—" RADIOLOCATION."—It was disclosed last week that one method of meeting enemy air attacks was a system of radio detection known as " radiolocation." By this means (the reflection of ether waves), which has proved very successful in operation, it is possible to detect solid bodies at considerable distances and has thus made it possible to relieve the R.A.F. of a good deal of patrol work. The system is in continuous operation and its development is due to a number of young scientists and R.A.F. officers headed by Mr. R. A. Watson Watt, scientific adviser on tele-communications to the Chief of the Air Staff, in conjunction with a number of engineers and manufacturers.

An appeal has been made for 10,000 men and women to assist in the maintenance and operation of the scheme. They are required to possess some knowledge of the construction and operation of large and small radio transmitters, and it is stressed that the experience which they gain will be of service to them in peacetime. Later, further numbers will be required by the three services.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1*s. each*) *can be obtained from the Patent Office,* 25, *Southampton Buildings, London, W.C.*2.

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21506. "Television and like systems and scanning members therefor." Scophony, Ltd., F. Okolicsanyi and A. J. Gale. July 24th, 1939. (536803.)

22100. "Galvanic batteries." W. W. Triggs (National Carbon Co., Inc.). August 29th, 1939. (536869.)

23608. "Electro-magnetic switches for remote control." W. J. Dawson, and Metropolitan Electric Supply Co., Ltd. August 16th, 1940. (536761.)

26076. "Electric steaming iron." W. W. Triggs (E. F. Pohl). September 18th, 1939. (536809.)

30170. "Lamps and other appliances or apparatus for use in illumination." P. Kavanagh. February 16th, 1940. (536766.)

30259. "Refrigerator cabinet construction." G. R. Shepherd (Westinghouse Electric International Co.). November 17th, 1939. (Convention date not granted.) (536817.)

30519. "Screw couplings for electric welding cables." J. Morelisse. November 28th, 1938. (536879.)

30660. "Electric heating apparatus for heating buildings, and for other domestic purposes." C. R. Belling and Belling & Co., Ltd. November 23rd, 1939. (536820.)

30733. "Starters for alternating current electric motors." A. West & Co., Ltd., and R. J. Benney. November 24th, 1939. (536892.)

30790. "Support for electric fuses or other accessories." Walsall Conduits, Ltd., and E. Gough. November 25th, 1939. (536770.)

30792. "Lanterns." British Thomson-Houston Co., Ltd. November 26th, 1938. (536771.)

31005. "Electric lighting fittings." E. Hirsch. November 28th, 1939. (536773.)

31098. "Method of, and means for, directing and diffusing light." F. H. Cotton. November 29th, 1939. (536887.)

31100. "Multiplex telegraph receiving circuit arrangements." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1938. (536888.)

31275. "Processes for producing copper base boron alloys, and oxygen-free copper base boron alloys of high electrical conductivity." A. H. Stevens (American Brass Co.). December 1st, 1939. (536893.)

31289. "Photographic flash lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 3rd, 1938. (536774.)

32371. Manufacture of hard or highly viscous insulating materials." Callender's Cable and Construction Co., Ltd., S. Beckinsale, and H. C. Page. December 16th, 1939. (536837.)

32372. "Manufacture of hard or highly viscous insulating materials." Callender's Cable and Construction Co., Ltd., S. Beckinsale and H. C. Page. December 16th, 1939. (536838.)

32781. "Wires or bands of refractory metal and the production thereof." Philips Lamps, Ltd. December 27th, 1938. (536902.)

1940

139. Apparatus for separating fluids." British Thomson-Houston Co., Ltd. January 5th, 1939. (536906.)

358. "Lighting systems." E. D. Dennis. January 6th, 1940. (536778.)

565. "Method of mixing sound records." Philips Lamps, Ltd. January 13th, 1939. (536909.)

763. "Washing machines." Hobart Manufacturing Co. January 13th, 1939. (536779.)

831. "Conduits for electrical conductors." Walsall Conduits, Ltd., A. E. Millard and W. Whalley. January 15th, 1940. (536911.)

1818. "Freezing trays." British Thomson-Houston Co., Ltd. February 1st, 1939. (536914.)

1867. "Vacuum cleaners." Electrolux, Ltd. (Aktiebolaget Elektrolux.) January 30th, 1940. (Convention date not granted.) (536850.)

2774. "Electrically heated soldering irons." G. R. Young. February 13th, 1939. (536918.)

2793. "Magnets." British Thomson-Houston Co., Ltd., and A. P. Young. February 14th, 1940. (536919.)

3873. "Current collectors for electric vehicles." Westinghouse Electric International Co. March 4th, 1939. (536853.)

4331. "Electrical systems for remote control and supervision." General Electric Co., Ltd., A. A. Chubb and L. A. Sherwood. March 8th, 1940. (536927.)

4594. "Time switching device for apparatus or machinery employing electric current." R. L. Alkin and D. R. Cranham. March 12th, 1940. (536854.)

5084. "Gasfilled electric discharge lamps." General Electric Co., Ltd., and M. Pirani. March 19th, 1940. (536928.)

5123. "Electrical switchgear employing air or gas blast circuit-breakers." D. R. Davies and Metropolitan-Vickers Electrical Co., Ltd. March 19th, 1940. (Addition to 526429.) (536929.)

5261. "Bases for electric lamps and similar articles." British Thomson-Houston Co., Ltd. March 25th, 1939. (536931.)

5612. "Electric discharge devices of the type employing liquid cathodes." British Thomson-Houston Co., Ltd. March 30th, 1939. (536932.)

6928. "Ventilation and lighting of mechanically propelled vehicles." W. Robins. April 17th, 1940. (536793.)

8451. "Retractile conductor cord and method of making such a cord." Standard Telephones & Cables, Ltd. May 12th, 1939. (536937.)

12097. "Electric resistance heaters." British Thomson-Houston Co., Ltd. July 29th, 1939. (536795.)

16493. "Separation of minerals by flotation." General Electric Co., Ltd., W. C. Hellyer and P. Rabone. November 14th, 1940. (536868.)

United States Electrical Exports

THE issue for last December of the Monthly Summary of the Foreign Commerce of the United States gives the totals for the whole of 1940. From this volume have been extracted the following figures showing the values of the electrical exports of the United States for that year, with notes of increases or decreases compared with 1939. The grand total was $116,708,000, an increase of $11,402,000, as compared with 1939. Nearly one-fifth of the aggregate consisted of radio apparatus. Statistics regarding countries of destination of American exports are available only in the official annual statement, which is still awaited.

	1940 $(000)	Inc. or dec. on 1939 $(000)
DC generators	870	+ 491
AC generators	1,725	+ 979
Steam turbine generator sets under 500 kW	63	— 197
Ditto 500 kW and larger	686	— 1,544
Accessories and parts for generators	1,088	+ 237
Motor-generator welding sets	1,167	+ 336
Non-rotating welding sets	500	+ 292
Self-contained lighting outfits	2,893	+ 1,367
Wind-driven generators	481	— 91
Storage batteries 6 and 12 V	1,873	+ 81
Other storage batteries	643	+ 29
No. 6 dry-cell batteries	165	— 47
Flash-light batteries	2,788	— 592
Other multiple-cell dry batteries	196	— 27
Other dry- and wet-cell primary batteries	178	— 58
Capacitors, ½ kVA and larger	95	+ 4
Power transformers, over 500 kVA	366	— 428
Distribution transformers, 500 kVA and less	952	+ 369
Instrument transformers	157	+ 42
Other transformers	818	+ 310
Mercury power rectifiers	147	+ 124
Rotating convertors under 300 kW	373	+ 5
Ditto, 300 kW and larger	363	+ 100
Complete battery chargers, non-rotating	244	— 11
Feeder voltage regulators	107	+ 48
Switchboard panels, except telephone	1,061	+ 249
Oil circuit-breakers and switches	346	+ 148
Power switches and circuit-breakers over 10 A	1,514	— 65
Fuses	216	+ 11
Watt-hour and other meters	753	+ 138
Electric indicating instruments	754	+ 92
Electric recording instruments	427	+ 128
Other electrical testing apparatus and parts	1,767	+ 387
Lightning arrestors, choke coils, reactors and parts	521	+ 68
Motors, ¼ HP and under	1,055	+ 206
Ditto over ¼ and under 1 HP	350	+ 5
Stationary motors, 1–200 HP	2,485	+ 1,005
Ditto over 200 HP	585	+ 93
Railway motors	91	+ 62
Electric locomotives, railway, mining and industrial	756	+ 33
Electric industrial trucks and tractors	505	+ 38
Starting and control equipment for industrial motors, and parts	2,260	+ 740
Ditto for railway and vehicle motors, and parts	135	+ 28
Accessories and parts for motors	2,077	+ 587
Portable electric tools	1,669	+ 235
Household refrigerators and parts	8,076	— 1,464
Commercial refrigerators and parts up to 1 ton	1,352	— 439
Parts for electric refrigerators	4,839	— 1,214
Flashlight cases	601	— 114
Electric fans	537	— 65
Lamps for automobiles, flashlights and Christmas trees	757	+ 352
Other metal filament lamps	1,263	+ 244
Other electric lamps	159	+ 35
Searchlight and airport beacons	3,391	+ 3,143
Floodlights	126	— 38
Household washing machines	1,197	— 951
Household washing machine parts	210	+ 41
Domestic vacuum cleaners	205	— 177
Domestic vacuum cleaner parts	335	+ 115
Other domestic motor-driven devices	398	— 237
Electric flat irons	250	— 30
Electric cooking ranges	402	+ 23
Other domestic heating or cooking devices and utensils	876	+ 166
Electric melting furnaces and parts	255	— 411
Heat-treating furnaces and parts	995	+ 297
Other industrial heating devices and parts	521	+ 196
X-ray tubes	480	+ 75
Other X-ray apparatus and parts	1,579	+ 182
Other therapeutic apparatus and parts	355	— 44
Radio transmitting sets, tubes and parts	3,288	+ 592
Receiving sets	10,155	— 297
Receiving tubes	2,452	— 549
Receiving set components	5,167	+ 202
Loudspeakers	353	— 222
Other receiving-set accessories	622	+ 130
Telegraph apparatus and parts	391	+ 91
Telephone instruments	297	+ 128
Other telephone equipment and parts	3,889	+ 699
Bells, buzzers, annunciators and alarms	375	+ 107
Starting, lighting and ignition equipment	1,179	+ 17
Insulating material	560	+ 153
Rigid metal conduit	720	+ 50
Other metal conduit, outlet and switch boxes	666	+ 223
Sockets, outlets, fuse blocks, lighting switches and parts	2,030	+ 544
Interior lighting fixtures and parts	2,008	+ 671
Exterior lighting fixtures and parts	337	+ 68
Other wiring supplies and line material	1,130	+ 50
Electric razors	147	— 771
Other electrical apparatus	13,566	+ 3,852

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities.

Reports and Dividends

Venner Time Switches, Ltd., report a trading profit for 1940 of £16,408, as compared with £11,121 for 1939. The contribution to the superannuation fund is £4,258, while £24,450 is set aside for depreciation. There is, therefore, a loss for the year of £12,154 (against £11,497). The half-year's dividend to March 31st, 1940, on the preference capital takes £1,200, and after allowing for £1,706 brought in, a profit of £549 on sale of the Fullers Way factory, and the transfer of £13,000 from general reserve there is a balance to be carried forward of £378. The chairman's address, which was to be delivered to the annual meeting yesterday (Thursday), has been circulated with the report and accounts. In this Viscount Falmouth states that the output dropped towards the end of 1939 and was down considerably during the first three months of 1940. Thereafter the position began to show improvement, and by May it seemed as if they had overcome the difficulties of the change-over. They were not, however, able to maintain the output reached in May. This was largely due to the works being out of balance. The work upon which the company was engaged showed only a small profit with the consequent effect that in order to show good results at the end of the year output must be maintained at as high a figure as possible. As a result of the rearrangement of the work the directors decided to dispose of the Fullers Way works, the transaction resulting in a small profit. So far as 1941 was concerned, the output was showing a very marked improvement and 1941 promised to be definitely better than 1940.

The British Electric Traction Co., Ltd., held its annual meeting on June 20th, when Mr. R. J. Howley (deputy chairman), who presided, said that the revenue for the year under review was again a high record for the company. The view had been expressed from time to time that all public road and rail transport should be nationalised. In his opinion it would be a very sorry day for the public if this should take place. Under their organisation the various public utility undertakings were operated by separate companies. This had proved efficient especially, under the test of wartime, because of the decentralisation of executive control, which allowed of quick decisions and the best use of available vehicles. There was a great deal to be said in favour of the personal touch between the management of the local companies and the travelling public. This would disappear on nationalisation.

Cable & Wireless (Holding), Ltd., reports a gross revenue for 1940 of £1,366,979, a decrease of £9,683, as compared with 1939, and a net profit of £1,207,950, a decrease of £10,477. As already announced, the ordinary dividend for the year is maintained at 4 per cent., less tax. The balance carried forward is raised by £10,463 to £236,686.

In view of the fact that many stockholders may be unable to attend the Annual General Meeting to be held on June 30th next, a statement by the governor (Lord Pender) has been circulated in advance of the meeting on Monday next. This refers to the effect of the requisitioning by the Treasury of certain American and other securities. This requisitioning of comparatively high-yielding holdings, at a time when suitable stocks affording a moderate return have been in increasingly short supply, has presented investors with a difficult problem as regards re-investment. The necessity to support the war effort to the greatest extent possible, on terms which quite rightly demand the acceptance of a very small return, is another factor involved in this problem.

As regards the investments as a whole, the past year has witnessed some recovery in prices generally. At the present time they had no knowledge of how the excess profits tax would affect the companies. The reserve fund investments having a book value of £13,725,845, were valued at December 31st last at £11,150,093, thus showing a depreciation of £2,575,752, or 19 per cent., as against 17 per cent. at the end of the previous year. The list of investments includes an item "electricity, gas and water, £618,502" (market value).

Cable & Wireless, Ltd., reports that message receipts, etc., rose from £5,690,769 for 1939 to £7,608,878 for 1940, and after meeting heavier working expenses, etc., providing £131,021 for cable renewals, and for writing £164,000, off the cost of terminating a joint purse agreement and other expenditures, there is a net profit of £2,375,771 (against £1,610,369). The dividend for the year is maintained at 4 per cent., and the balance carried forward is raised from £437,836 to £1,613,607. The report states that it is not yet possible to estimate the company's liability to E.P.T., the determination of which depends upon the basis of assessment which may finally be applied to Cable & Wireless (Holding), Ltd. Until this question is settled no provision can be made for the amount of tax to be apportioned to the operating company.

Marconi's Wireless Telegraph Co., Ltd., reports a net profit for 1940 of £168,484, as compared with £150,793 for the preceding year. This allows for administrative and research salaries and expenses of £308,332, depreciation £60,432 and written off foreign investments £26,484. As already announced, the final ordinary dividend is 3¼ per cent., again making 7 per cent. for the year and £13,748 is carried forward against £4,174 brought in).

The Craigpark Electric Cable Co., Ltd., reports a net profit for the year ended March 31st of £8,423, as compared with £15,092 for 1939-40. Preference dividends for the three years to March 31st, 1938, are met, leaving £17,679 to be carried forward (against £13,210 brought in).

The Ebonite Container Co., Ltd., reports net profits, after tax, for the year to February 28th of £17,304, as compared with £13,566 for the preceding year. As already announced the total distribution for the year is 17 per cent. (against 14 per cent.), and £13,435 is carried forward (against £10,581 brought in).

The Electric & General Investment Co., Ltd., reports a net revenue for the year ended May 31st of £3,129, as compared with £2,795 for the previous year. The final dividend is 6¼ per cent., making 9 per cent. for the year (against 7½ per cent.), and £19,720 is carried forward (against £19,403 brought in).

The Revo Electric Co., Ltd., has announced a final dividend of 10 per cent., together with a cash bonus of 5 per cent., making a total distribution for the year ended March 31st of 20 per cent. (against 5 per cent.).

W. B. Dick (Holdings), Ltd., reports a net profit, after tax, of £23,540, for the year ended March 31st (against £44,013 for 1939-40). The preference share redemption fund receives £30,620, and the final ordinary dividend is 6 per cent., again making 10 per cent. for the year. The balance carried forward is £30,620 (against £36,910 brought in).

The Chloride Electrical Storage Co., Ltd., is paying a final dividend on the "A" and "B" ordinary stocks of 5 per cent., plus a bonus of 5 per cent., making the total distribution for the year 15 per cent. (unchanged).

Newton Bros. (Derby), Ltd., have announced a first and final dividend of 12½ per cent. (same).

The Anglo-Portuguese Telephone Co., Ltd., reports a net profit for the past year of £84,882, as compared with £81,853. The ordinary dividend for the year is maintained at 8 per cent., by a final payment of 5 per cent.

Newman & Watson, Ltd., report a net profit for the year ended March 31st, before tax, of £5,036, as compared with £4,481 for the preceding year. The dividend is paid on the 6 per cent. cumulative preference shares.

The Madras Electric Tramways (1904), Ltd., reports a gross profit of £15,414 for 1940, as compared with £16,809 for 1939, and after deducting interest, London office expenses, and providing £2,499 for the 5½ per cent. debentures sinking fund, and transferring £6,500 to depreciation and renewals account, there is a loss of £2,134. This is deducted from the balance brought in, leaving £6,203 to be carried forward.

The Eastern Telegraph Co., Ltd., has announced a final ordinary dividend of 7½ per cent., making 11½ per cent. for the year (unchanged).

New Companies

J.P.A. Transformers Ltd.—Private company. Registered June 11th. Capital £600. Objects: To carry on the business of manufacturing, electrical, constructional and general engineers, manufacturers of, and dealers in, electrical transformers, coil winding apparatus, electro-magnets, etc. J. P. Annacker, 15, Kingsgate Avenue, Finchley, N.3, is the first sole director. Registered office: 33, St. James' Street, S.W.1.

Page Engineering Co., Ltd.—Private company. Registered June 14th. Capital £500. Objects: To carry on the business of engineers, manufacturers of, and dealers in, dynamos, motors, magnetos, batteries, conductors, insulators, motor vehicles, cycles and accessories, etc. Directors: Wm. A. S. Long, Frilsham House, Barnett Wood Lane, Ashtead, and R. B. Page, 8, Woodlands Road, Surbiton, Surrey.

Companies' Returns

Mortgages and Charges

Air Ducts, Ltd.—Mortgage and general charge on the company's undertaking and property, present and future, including uncalled capital, dated May 27th, 1941, to secure all moneys due or to become due from the company to National Provincial Bank, Ltd.

Underwood (Electric), Ltd.—Assignment of debts due, or to become due, under certain contracts, dated June 4th, 1941, to secure all moneys due, or to become due, from company to Martins Bank, Ltd., not exceeding £4,000.

R. & W. Electrical, Ltd.—Satisfaction to the extent of £500 on May 13th, 1941, of debenture registered July 14th, 1939.

Liquidation

Terry's Wireless, Ltd.—Meeting July 30th at 26, Abbey House, Victoria Street, London, S.W.1, to receive an account of the winding-up by the liquidator, Mr. F. Phillips.

Bankruptcies

H. M. Brown, electrical engineer, carrying on business at 97, St. Helen's Street, Ipswich, under the style of Wood & Co.—This debtor applied for his discharge on June 11th at the Shire Hall, St. Helen's Street, Ipswich. The failure occurred in January, 1939, and a dividend of 6s. 6¼d. in the £ had been paid to the creditors. The Official Receiver reported that the debtor had been connected with a limited liability company which went into liquidation. The assets of the concern were purchased by Mrs. Brown and another person and the debtor continued the business. The discharge was granted, subject to two months' suspension.

H. A. Tutte, electrical engineer, 32, Merry Hill Road, Bushey, Herts.—Trustee, Mr. A. H. Ward, 29, Russell Square, London, W.C.1, Official Receiver, released June 13th.

F. J. Harrison, electrician, Dicconson Street, Wigan.—Last day for receiving proofs for dividend July 1st. Trustee, Mr. J. Airey, 8, Victoria Street, Liverpool.

STOCKS AND SHARES

TUESDAY EVENING.

THE more complicated and obscure the war position grows, even when such things happen as Germany's march on Russia, the more certain does it seem that Stock Exchange prices will go better. The anomaly receives fresh confirmation almost every week. The heavier the Government borrowing, the greater the impetus given to the buying movement of British Government and other gilt-edged stocks. Intimation that a second thousand million pounds credit vote is to be sought, when Parliament meets, for the year 1941–2, instead of acting as a depressing element, gave renewed encouragement to the rise in existing securities. This may be explained by reference to the fact that the Treasury has obtained such complete control of the money market that the issue of the next War Loan will be made, it is taken for granted, on terms less favourable to the lender than those now available. Consequently there is an insatiable demand for stocks and shares that will look cheap at to-day's prices when compared with the next Government issue.

Good Markets

The Central Electricity Board has obtained a Special Order increasing its maximum borrowing powers by £10 millions to £70 millions. Both Houses of Parliament must approve this order by resolution, which will undoubtedly be passed. A feature in our price-lists this week is the manner in which industrial ordinary shares are advancing. In the list of equipment and manufacturing shares, every change this week is in the upward direction, in spite of the difficulty of obtaining shares at the advanced prices.

Cable and Wireless

Cable and Wireless ordinary stock slipped back to 61 ex dividend, equivalent to 63 before the dividend was deducted from the price, but the fall was recovered upon publication of the figures. These, as was expected would be the case, are good. They show that the combine could have paid 4½ per cent. on the ordinary stock without unduly straining its financial resources, but a conservative policy is recognised as being no more than discreet in present circumstances. In the market, a 4 per cent. dividend on the ordinary stock is regarded as being more or less stereotyped for the duration of the war. At the present price, the yield on the money is £6 7s. per cent., and, as a speculative investment, the stock is regarded as worth inclusion in any list in which such a yield is not considered to be too high for safety.

Price Fluctuations

Mention has already been made of the manner in which the ordinary shares of companies dealing with electrical equipment and manufacture are going ahead. International Combustion shares have risen 5s. to 97s. 6d., British Insulated ½ to 85s., Walsall Conduits 4s. shares at 28s. 9d. are half-a-crown up, the buying pressure from the Provinces being persistent. The recently published figures were decidedly good. Gains of ½ are frequent amongst the investment shares. Callender's are better, on maintenance of the previous dividend of 15 per cent.

That speculation is by no means dormant is shown by a fresh jump of 9d. in Electric and Musical Industries, where shares have changed hands up to 11s., as against 7s. 6d. early last month. Amongst transport shares, Thomas Tilling shares have risen to 43s. 9d.; West Riding are a florin up at 38s. The electricity supply list shows little alteration: Metropolitans have hardened to 32s., Electric Finance to 42s. 6d. In the Overseas group, some of the Canadian stocks show a slight improvement. A decline to 14s. 6d. in Palestine Electrics is easily understandable.

Transport "C"

Attention has been called here on several previous occasions to the fact that London Passenger Transport "C" stock would probably command a better price, were it not for the attraction of other junior Home Railway securities upon which the yield, on the last-paid dividend, is higher than that available from Transport "C." These competitors, as they may be called, have been rising in price. This has served to release the lever which held down the price of Transport "C." A little buying sufficed to raise the quotation to 34, at which there is not a great deal of stock on offer. If the last-paid dividend of 3 per cent. is maintained, the yield on the money would still be 83s. 4d. per cent. Metropolitan assented stock remains in favour. Substantial buyers are in the market at 49½ or thereabouts, but there seems to be no stock on offer under 50, nor is it certain that any large amount would be obtainable at that price. Southern Railway preference has risen 2 to 52½, and the 5 per cent. preference 10s. to 94.

Marconi Wireless

Marconi's Wireless Telegraph Co. has declared a final dividend, as previously announced, of 3 per cent. on the ordinary shares, making once more 7 per cent. for the year, the dividend being payable on June 28th. The price of the £1 shares is approximately 12s. 6d.—approximately, because there is very little market in the shares, the great majority of which are held by Cable and Wireless. The same applies to Eastern Telegraph stock, of which Cable and Wireless holds all but a negligible amount. The Eastern Telegraph has declared a final dividend of 7½ per cent., again making 11½ per cent. for the year. Occasionally stock comes to market; the nominal price is about 90. The stock can be sold without any difficulty, the principal buyer presumably being Cable & Wireless.

Tax-Free Payments

The Chancellor of the Exchequer has now made it quite certain that the proposed new clauses of the Finance Bill, dealing with payments covenanted to be made free of tax, do not apply in the case of dividend payments on preference or ordinary shares. Sir Kingsley Wood agreed that although the amount receivable by preference shareholders was dependent on the existence of profits sufficient to meet the obligation, this factor would not, of itself, be sufficient to differentiate preference shares of this type from certain types of payment which his proposal covered. Such an assurance on the part of the Government had the effect of promptly restoring to their previous levels the preference shares upon which the dividends are paid free of tax. If the Government's statement had been made a little earlier, it would have saved a good deal of perturbation to holders of preference shares upon which the dividends are distributed tax free.

Dividend Effects

June and December are the two months of the year when dividend announcements come most thick and fast. Every business day, the electric bells in the Stock Exchange which draw members' attention to the fact that a dividend declaration is about to be made on the "Trans Lux" indicators, seem to be ringing incessantly. The crimson electric lights which supplement the noise of the bells, are constantly twinkling. Hundreds of prices have been quoted ex dividend during the past week or so. Theoretically this should bring business both from buyers and sellers. The buyers think that, by waiting until a price is quoted ex dividend, they may get the shares relatively cheaply; sellers frequently defer dealing until a price goes "ex," because they like to handle dividend-cheques themselves and they trust to the price promptly recovering part of the deduction of the dividend.

These aids to activity certainly add business to Stock Exchange markets, and it is known that substantial lines of stocks and shares have recently been changing hands without prices being affected one way or the other. The volume of what may be called bread-and-butter business, concerned, that is to say, with comparatively modest orders to buy and sell, is not considerable, but Stock Exchange brokers are well aware that large lines of stock in the gilt-edged market are daily dealt in.

Rations

With so little seriousness is the proposal regarded to ration gas, electricity and coal, that prices in the Home electricity supply group have moved scarcely at all since the announcement was made. It was suggested here last week that proprietors of shares in the electricity supply companies were not at all likely to be rendered apprehensive by such a possibility. The Stock Exchange market view of the matter is that merely from the point of view of a company's profits, these are not likely to be affected to any material extent if the proposal should crystallise into an Order. To some extent the public have rationed themselves already and any further diminution in the amount of electric current consumed is expected to be too slight for it to affect profit and loss accounts. So firm is the market for shares in the electricity supply list that whenever shares do come to market, and that is seldom except on account of deceased holders, they are promptly placed amongst investors who, following the fashion of the moment, figuratively queue up in order to obtain them.

Essential Work

THE Ministry of Labour and National Service has made the Essential Work (Building and Civil Engineering) Order, 1941, which empowers him to schedule undertakings in these industries as engaged on essential work and make rules for their operation.

It is laid down that "building industry" means (*a*) the construction, alteration, repair, decoration or demolition of buildings, and (*b*) the carrying out, in conjunction with the carrying on of such activities, of any processes, operations or manufactures incidental to or necessary for the carrying on of such activities.

The term "civil engineering contracting industry" covers (*a*) the construction, reconstruction, alteration, repair or demolition of docks, harbours, bridges, roads, viaducts, aqueducts, canals, pipe lines, plant foundations, cooling towers and ponds, cable trenches, cable ducts, railways, aerodromes, sea defences, the erection of overhead line supports, etc., and (*b*) the carrying out of processes, operations or manufactures incidental to or necessary for the carrying on of these activities.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1941 Highest	1941 Lowest	Dividend Previous	Dividend Last	Middle Price June 23	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	48/6	45/–	15	12½	46/3	..	5 8 3
British Power and Light	27/9	23/–	7	6	24/6	..	4 18 0
City of London	22/6	20/–	7½	7	21/3	..	6 11 9
Clyde Valley	36/6	33/6	8	8	34/6	..	4 12 9
County of London	34/6	30/–	10½	8	30/–	..	5 6 8
Edmundson's:							
7% Pref.	31/–	25/6	7	7	30/9	..	4 11 1
Ord.	26/–	23/6	6	6	26/–	..	4 12 4
Elec. Dis. Yorkshire	39/–	36/–	9	9	38/9	..	4 12 9
Elec. Fin. and Securities	42/6	39/–	12½	12½	42/6	+¼	5 17 8
Elec. Supply Corporation	39/–	36/–	11½	10	38/9	..	5 3 3
Isle of Thanet	8/–	6/–	2	Nil	7/6	..	—
Lancs Light and Power	31/6	28/6	7½	7½	31/3	..	4 16 0
Llanelly Elec.	21/–	19/6	5½	5½	20/–	..	5 10 0
Lond. Assoc. Electric	16/6	12/6	5½	4½	15/–	..	6 0 0
London Electric	23/6	21/3	7	7	22/6	..	6 4 5
London Power Deb. Red	103½	102	5	5	103	..	4 17 1
Metropolitan	34/6	31/–	10	8	32/–	+9d.	5 0 0
Midland Counties	35/6	32/9	8	8	35/–	..	4 11 5
Mid. Elec. Power	35/–	33/3	9	9	35/–	..	5 2 10
Newcastle Elec.	26/3	24/6	7	7	25/–	..	5 12 0
North Eastern Elec.:							
Ordinary	29/–	25/6	7	7	27/6	..	5 1 10
7% Pref.	32/6	29/–	7	7	32/6	..	4 6 2
Northampton	2¼	39/6	10	10	41/3	..	4 17 0
Notting Hill 6% Pref.(£10)	9	8	6	6	8½	..	—
Northmet Power:							
Ordinary	34/6	28/6	10	7	28/9	..	4 17 4
6% Pref.	29/6	27/3	6	6	29/6	..	4 1 4
Richmond Elec.	20/–	18/–	6	6	18/9	..	6 8 0
Scottish Power	36/6	33/–	8	8	36/3	..	4 8 5
Southern Areas	16/6	14/6	5	5	16/3	..	6 3 0
South London	20/–	19/3	7	7	20/–	..	7 0 0
West Devon	21/6	20/9	5	5	21/3	..	4 14 1
West Glos.	18/3	17/3	4½	4½	17/6	..	5 2 10
Yorkshire Elec.	38/3	34/6	8	8	38/3	..	4 4 0
Overseas Electricity Companies							
Atlas Elec.	2/6	1/6	Nil	Nil	2/–	..	—
Calcutta Elec.	37/3	33/–	8•	7•	35/6	..	3 19 0
Cawnpore Elec.	30/–	26/–	10	10	28/9	..	7 5 9
East African Power	25/6	21/6	7	7	25/–	..	5 12 0
Jerusalem Elec.	22/6	18/6	7	7	18/9	..	7 9 4
Kalgoorlie (10/–)	12/6	11/–	7½	7½	12/6	..	6 0 0
Madras Elec.	25/3	23/6	8•	6•	23/9	..	—
Montreal Power	31	24	1½	1½	24	+½	6 5 0
Palestine Elec. "A"	20/6	14/–	Nil	Nil	14/6	−1/9	—
Perak Hydro-electric	18/3	16/3	2½	6	16/3	..	7 7 8
Shawinigan Power	18½	14	83cts.	90cts.	14½	+½	—
Tokyo Elec. 6%	40½	36	6	6	33½xd	−1	17 18 0
Victoria Falls Power	76/6	69/6	15	15	76/3	+¼	3 18 6
Whitehall Investment Pref.	14/9	8/3	7½	7½	10/–	..	15 0 0
Public Boards							
Central Electricity:							
1950–70	110½	108	5	5	110½	..	4 10 6
1955–75	113½	109½	5	5	113	..	4 8 6
1951–73	108	105½	4½	4½	107	..	4 4 1
1963–93	101	94	3½	3½	100	..	3 10 0
1974–94	94	87½	3½	3½	94	..	3 9 2
London Elec. Trans. Ltd.	94	91½	2½	2½	94	..	2 13 2
London & Home Counties							
1955–75	108	106	4½	4½	108	..	4 3 4
Lond. Passenger Transport:							
A	120	109	4½	4½	115½	..	3 18 0
B	114	102½	5	5	110½	..	4 10 8
C	36	29	1½	3	34	+2	8 16 6
West Midlands Joint Elec.							
1948–68	108½	103	5	5	108½	..	4 12 0
Telegraph and Telephone							
Anglo-Am. Tel:							
Pref.	103½	99	6	6	103½	..	5 16 1
Def.	24	21	1½	1½	22½	..	6 13 4
Anglo-Portuguese	17/6	12/6	8	8	12/6	..	12 16 0
Cable & Wireless:							
5½% Pref.	102	93	4½	5½	100	..	5 10 0
Ord.	68	52½	4	4	63	−2	6 7 0
Canadian Marconi $1	5/–	4/–	Nil	4cts.	5/3	+3d.	3 4 0
Globe Tel. & Tel.:							
Ord.	29/–	26/–	7½•	6•	27/6	..	4 7 3
Pref.	28/–	25/–	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	14	10½	20	20	12½	..	—
Inter. Tel. & Tel.	3½	2½	Nil	Nil	3	..	—
Marconi-Marine	25/–	19/9	7½	7½	25/–	+¼	6 3 0
Oriental Telephone Ord.	56/6	47/–	12•	11½•	2 13/16	..	4 1 10
Telephone Props.	11/6	11/–	6	6	11/3	..	10 13 4
Telephone Rental (5/–)	7/9	6/9	10	10	7/3	..	6 18 0

Company	1941 Highest	1941 Lowest	Dividend Previous	Dividend Last	Middle Price June 23	Rise or Fall	Yield £ s. d.
Traction and Transport							
Anglo. Arg. Trams:							
First Pref. (£5)	2/3	1/–	Nil	Nil	2/–	..	—
4% Inc.	8½	4	Nil	Nil	6	+½	—
British Electric Traction:							
Def. Ord.	830	740	45	45	800	..	5 12 6
Pref. Ord.	167	150	8	8	160	..	5 0 0
Bristol Trams	40/–	36/–	8•	8	36/3	..	4 8 5
Brazil Traction	8	6½	$1	50c.	7½	..	—
Calcutta Trams	19/9	18/–	8	5½	18/–	..	6 2 3
Cape Elec. Trams	17/6	16/6	5	5	17/–	..	5 17 4
Lancs Transport	39/9	36/–	10	10	38/9	..	5 3 1
Mexican Light:							
1st Bonds	40	34½	5	5	40	..	—
Rio 5% Bonds	85½	82½	5	5	85	..	5 17 8
Southern Rly.:							
5% Prefd.	53½	43½	5	5	52½	+2	9 10 6
5% Pref.	95	77½	5	5	94	+½	5 6 0
T. Tilling	44/–	34/6	10	10	43/9	+¼	4 11 4
Tilling & B.A.	48/–	45/6	8•	7•	45/9	..	3 1 2
West Riding	38/–	34/–	10	10	38/–	+2/–	5 5 4
Equipment and Manufacturing							
Aron Electricity Ord.	18/6	16/–	15	Nil	18/–	..	—
Assoc. Elec.:							
Ord.	42/6	38/3	10	10	42/6	..	4 14 3
Pref.	36/–	33/3	8	8	35/–	..	4 11 5
Automatic Telephone & El.	47/3	32/–	12½	12½	41/3	..	6 1 1
Babcock & Wilcox	43/3	39/–	11	11	42/6	+6d.	5 3 6
British Aluminium	43/6	39/–	12½	10	42/6	+¼	4 14 0
British Insulated Ord.	88/3	78/9	20	20	85/–	+½	4 14 1
British Thermostat (5/–)	12/6	10/6	18½	18½	12/6	..	7 8 0
British Vacuum Cleaner(5/–	6/3	6/–	40	12½	6/3	..	10 0 0
Brush Ord.	4/3	3/6	Nil	Nil	3/9	..	—
Callender's	65/6	58/6	15	15	63/9	+¼	4 14 0
Chloride Elec. Storage	63/6	60/–	15	15	62/6	..	4 15 10
Consolidated Signal	65/–	60/–	17	17	62/6	..	5 8 7
Crabtree (10/–)	24/–	21/3	17½	17½	23/9	..	7 7 4
Crompton Parkinson:							
Ord. (5/–)	19/–	17/9	30	20	18/9	..	5 6 8
E. K. Cole (5/–)	5/–	2/9	10	Nil	5/–	+3d.	—
Elec. & Musical Industries (10/–)	11/–	7/3	5	Nil	10/6	+9d.	—
Electric Construction	30/–	25/–	13½	10	28/9	+¼	6 19 0
Enfield Cable Ord.	51/–	45/–	16½	12½	45/–	..	5 11 3
Electrical Switchgear (10/-)	22/6	20/–	16	10	20/–	..	5 0 0
English Electric	35/–	29/–	10	10	35/–	+¼	5 14 2
Ensign Lamps (5/–)	16/3	15/–	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)	37/3	35/–	25•	22•	35/–	..	3 2 10
Ever Ready (5/–)	27/6	25/–	40	40	27/6	..	7 5 6
Falk Stadelmann	16/9	13/9	6	7	15/9	..	8 17 10
Ferranti Pref.	25/6	23/6	7	7	25/–	..	5 12 0
G.E.C.							
Pref.	33/–	30/6	6½	6½	32/6	..	4 0 0
Ord.	84/–	77/–	20	20	83/9	..	4 15 8
Greenwood & Batley	21/–	18/6	15	13	20/–	..	13 0 0
Hall Telephone (10/–)	14/–	10/–	15	10	13/9	..	7 5 6
Henley's (5/–)	21/6	19/6	20	20	20/–	..	5 0 0
4½% Pref.	21/6	20/–	4½	4½	21/3	..	4 4 8
Hopkinsons	45/–	37/6	15	15	44/–	..	6 16 4
India-Rubber Pref.	21/6	19/6	5½	5½	21/3	..	5 3 6
Intl. Combustion	97/6	81/3	32½	30	97/6	+½	6 3 0
J. Lucas	59/–	50/6	15	15	58/9	..	5 2 0
Johnson & Phillips	48/3	43/–	15	15	47/6	+¼	6 6 4
Lancashire Dynamo	53/6	50/–	20	20	52/6	..	7 12 5
Laurence, Scott (5/–)	10/–	7/6	15	15	10/–	+9d.	7 10 0
London Elec. Wire	25/6	20/–	7½	7½	22/6	..	6 13 4
Mather & Platt	40/–	32/–	13½	10	39/6	..	5 6 8
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	..	5 3 6
Murex	84/6	75/–	20	20	83/9	..	4 15 8
Pye Deferred (5/–)	11/6	10/9	25	25	11/3	..	11 2 2
Revo (10/–)	23/9	18/9	17½	5	23/9	+¼	2 2 1
Reyrolle	55/–	47/9	12½	12½	53/9	+¼	4 13 0
Siemens Ord.	22/9	17/–	7½	7½	21/3	..	7 1 2
Strand Elec. (5/–)	2/–	1/–	4	2	2/–	..	5 0 0
S. Smith (1/–)	7/9	5/9	37½	50	6/3	..	8 0 0
Switchgear & Cowans (5/–)	9/–	7/3	10	15	8/9	..	8 11 6
Telegraph Condenser (10/–)	12/6	7/–	Nil	5	12/6	..	4 0 0
Telegraph Construction	40/–	34/6	10	10	40/–	..	5 0 0
Telephone Mfg. (5/–)	7/6	6/9	9	9	7/3	..	6 4 2
Tube Investments	92/6	89/–	23½	23½	92/6	+¼	5 2 3
Vactric (5/–)	2/3	2/–	4	Nil	2/–	..	—
Vickers (10/–)	16/–	14/–	10	10	15/9	+3d.	6 7 0
Ward & Goldstone (5/–)	19/9	12/6	20	20	16/6	..	5 19 9
Westinghouse Brake	42/6	39/6	17½	10	42/–	..	4 15 1
Walsall Conduits (4/–)	29/–	24/6	55	55	28/9	..	7 12 9
West Allen (5/–)	4/3	3/6	7½	7½	3/9	..	10 0 0

• Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work.

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parenthesis.

Eire. — GALWAY. — July 4th. Sewage pumps, electric motors, ejectors, &c., in connection with the Gort sewage scheme. Tenders to secretary, Galway Board of Health, Central Hospital.

South Africa.—DURBAN.—City Council. July 4th. Five 15-kVA transformers.
July 18th. 33 kV 3-phase switches and busbar supports (Contract E.2029).
PORT ELIZABETH.—City Council. July 24th. Cable, copper wire and house service cut-outs.

Weymouth & Melcombe Regis.—June 30th. Electricity Department. 150-kVA indoor type transformer. (June 20th.)

Orders Placed

Herts.—C.C. Emergency Committee. Accepted. Electric heating of cleansing unit.—J. W. Russell, Ltd. Lighting installation at shelters at Hempstead House, Hemel Hempstead (£76).—Buchanan & Curwen.

London.—METROPOLITAN WATER BOARD.—Accepted for emergency plant. Twelve centrifugal pumping units (£22,766).—W. H. Allen, Sons & Co. Four submersible type borehole pumps (£6,837).—Hayward-Tyler & Co. Six DC motors, each of 375 BHP, complete with control gear (£9,481).—Metropolitan-Vickers Electrical Co. Six AC motors, each of 475 BHP, complete with control gear (£5,708).—Electric Construction Co. Two 150-kW Diesel-engine driven alternators, each mounted on two trailers (£11,896).—Petters. Twelve 150-kW rectifiers (£11,035).—Bruce Peebles & Co. Six 400-kW transformers (£3,096).—Yorkshire Electric Transformer Co. Twelve portable circuit-breakers.—Metropolitan-Vickers Electrical Co. (£558); Yorkshire Switchgear & Engineering Co. (£714) (six from each company). Three condensing steam turbine driven alternators, each 350 kW capacity, mounted complete on mobile trailers (£22,653).—Belliss & Morcom. Eight water tube boilers.—W. Y. Lewis (£13,786); J. Samuel White & Co. (£13,555) (four from each company).

HAMMERSMITH.—Borough Council. Accepted. Six e.h.v. switch units (£1,047).—J. G. Statter & Co. Oil-filtering equipment (£236).—Metafiltration Co.

Middlesbrough.—TOWN COUNCIL. Accepted. Electric cable (£1,460).—Britannic Cable and Construction Co.

Warrington. — Electricity Committee. Accepted. Switchgear (£1,536).—Ferguson, Pailin.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alford.—School canteen at Grammar School for Lindsey E.C.; P. W. Birkett, county architect, County Offices, Newland, Lincoln.

Ashington.—Community feeding centres at the North and East Schools for the U.D.C.; direct labour.

Ayr.—Extension scheme at County Hospital to cost £2,500; Medical Superintendent.

Barnsley.—Buildings (£1,500), Littleworth Schools, for E.C.; H. Taylor, borough surveyor, Town Hall.

Belfast.—Wooden bungalows, for R.D.C.; surveyor, Rural Council Offices.

Billingham-on-Tees.—Community kitchens; J. H. Hill, U.D.C. surveyor.

Birkenhead.—Additions and alterations to police station, for T.C.; E. W. Tame, town clerk, Town Hall.

Brandon.—Community feeding centres at Brandon, Ushaw Moor, and Waterhouses; F. Hedley, U.D.C. architect.

Bristol.—Repairs, Guildhall (£3,130); city engineer.

Carmarthen.—Nursery school, for E.C.; borough surveyor, John Street.

Coleshill.—Communal feeding centres at Church Halls at Coleshill, Water Orton and Marston Green for Meriden R.D.C.; H. Pickering, engineer and surveyor, Town Hall.

Colne Valley.—National Restaurant, Marsden (£1,486), and kitchen and restaurant, Slaithwaite (£2,106), for U.D.C.; engineer, Spa Hall, Slaithwaite.

Coventry.—Housing outside city boundary, for T.C.; D. E. Gibson, city architect, 1a, Warwick Row.

Cowdenbeath.—Police station, for Fife County Police Committee.

Croydon.—Rebuilding portion of Town Hall, for T.C.; E. Taberner, town clerk, Town Hall.

Darlaston.—Proposed fire station (£15,000), for U.D.C.; N. H. Hughes, surveyor, Town Hall.

Darlington. — Cleansing post at the Memorial Hospital; Bussey & Armstrong, builders, Brinkburn Road.

Daventry.—Hostels for agricultural workers, for War Agriculture Executive Committee.

Denton.—Works extensions, Windmill Lane; Drury and Gomersall, architects, 11, Imperial Buildings, Oxford Road, Chorlton-on-Medlock.

Droitwich. — British Restaurant at the Girl Guides' Hall for the T.C.; R. E. Hulse, borough surveyor, Town Hall.

Dublin.—Alterations and repairs at several schools, for E.C.; L. E. O'Carroll, chief executive officer, Technical Schools, Bolton St.

Durham. — Alterations at Central Fire Station for T.C.; city engineer, Town Hall, Market Place.

Easthampstead.—Proposed fire station, for R.D.C.; D. H. M. Saunders, clerk, Council Offices, Bracknell, Berks.

Flaxton (York.).—Alterations at Council Offices, Bootham, for R.D.C.; surveyor, 10, Museum Street, York.

Frome.—Reconstruction and repair of houses, Nunney Road, for U.D.C.; R. W. H. Vallis, architect.

Gateshead-on-Tyne.—Offices for Maple & Gillett, James Road; P. L. Browne, Son, & Harding, Pearl Buildings, Newcastle-on-Tyne.
Canteen at the works of Emerson, Walker, Ltd.; Messrs. Bewley & Scott, contractors, Dunston-on-Tyne.
Clothing store for Jackson's, Tailors, Ltd.; W. W. Kelsey, Back Hanover Square, Newcastle.

Glasgow.—Workshop, Balmoral Street; Mechans, Ltd.
Buildings, Bellfield Street; Scottish Speedwell Co., Ltd.

Guildford.—Public library (£5,360), for T.C.; borough engineer, Municipal Offices, High St.

Hawick.—British Restaurant in Town Hall (£1,522), for T.C.; borough surveyor, Municipal Buildings.

Hendon.—Additions and alterations to depot buildings at Hendon Way and Mill Hill and establishment of 21 feeding centres, for T.C.; borough engineer, Town Hall, Hendon, N.W.4.

Higher Crumpsall.—Flats, corner of St. Mary's Road and Seymour Road; H. & J. R. Bradshaw, builders, Mill Farm House, Blackley.

Kenilworth.—Adaptation of "The Towers" for 40 in-patients for board of Coventry and Warwickshire Hospital; W. S. Hattrell and Partners, architects, 1, Queen's Rd., Coventry.

Lanchester.—Feeding centres at Langley Park and Burnhope, for R.D.C.; surveyor, Council Offices.

Leyburn (Yorks.).—Additions, sewage disposal works, for the R.D.C.; F. J. Rodwell & Son, engineers, 10, Park Row, Leeds.

Maidenhead.—Extensions to office accommodation; Odeon Theatres, Ltd.

Manchester.—Additions, Dr. Garrett Memorial Homes and nurseries (£7,210), for T.C.; G. N. Hill, City architect, Town Hall.
Re-building St. George's Tavern, Tack Street and Dawson Street for Groves & Whitnall, Ltd.; Brameld & Smith, architects, 81, Upper Brook St., Chorlton-on-Medlock.
Works additions, Sharston Road; H. S. Fairhurst & Son, architects, 55, Brown Street.

Markinch.—Housing scheme, School Street site, for T.C.; borough surveyor.

Middlesbrough.—Emergency kitchens at five schools for T.C.; Stephen Coates, Ltd., builders, Middlesbrough.

Newcastle-on-Tyne.—Extensions, tobacco factory, for J. Sinclair & Co., Ltd., Oystershell Lane; J. Walton Taylor & Son, Norwich Union Buildings.

Northants.—Extensions to Isolation Hospital, for C.C.; G. H. Lewin, county architect, County Hall, Northampton.

Openshaw.—Adaptations at day nursery (£1,000), for Manchester T.C.; G. N. Hill, city architect, Town Hall.

Oxford.—Communal feeding centre, Church Hall, New Inn, Hall Street, and garage and control room for fire brigade, for T.C.; borough engineer, Municipal Buildings.

Pershore.—Hostels for agricultural workers at Stoulton and Hurst Park, and offices at Bow Brook, Peopleton, for R.D.C.; surveyor, Council Offices, High Street.

Prestwich.—Alterations at shop premises, 405, Bury New Road, for T.C.; borough engineer, Town Hall.

Purton.—Community kitchen, for Cricklade and Wootton Bassett R.D.C.; surveyor, 141, High Street, Wootton Bassett.

Rochdale.—Alterations at Cottage Homes, Middlewood, for T.C.; borough surveyor, Town Hall.

Rusholme.—Additions to premises, for Freeholds & Leaseholds, Ltd.; Oakley & Sanville, architects, 60, King St., Manchester.

Shotley Bridge (Co. Durham).—Alterations, block "B," Emergency Hospital (£618); R. C. Williamson, builder, Rowlands Gill.

Spenborough.—Additional fire brigade accommodation, for U.D.C.; surveyor, Town Hall, Cleckheaton.

Stockton-on-Tees.—Conversion of Nos. 9 and 10, Yarm Road into flats; D. Crawford architect, 82, Borough Road, Middlesbrough.

Stoke-on-Trent.—Alterations, etc., Roller Arms, Tunstall, and Cobridge Hotel, Burslem; Parkers Burslem Brewery Co., Ltd.

Stroud.—Fire station (£15,619), for R.D.C.; surveyor, Council Offices, John Street.

Swansea.—Alterations and additions, 22–4, Walter Road; Ben Evans & Co., Ltd.
Alterations and additions, 208, Oxford Street; Phillips & Sons.

Twickenham.—Additions, 157, Richmond Road; Folshom, Builders, Ltd.

Tynemouth.—Rebuilding workshop, Union Road, for R. Irwin & Sons, Ltd.; Tasker & Child, architects.

Walsall.—British Restaurant, for T.C.; M. E. Habershon, borough surveyor, The Council House.

Warrington.—Works additions, Howley; J. Chadwick & Sons.

West Didsbury.—Eight houses and garages, Barlow Moor Road and Holme Road; A. Allen (Builders), Ltd., 10, Crescent Road, Hale, Ches.